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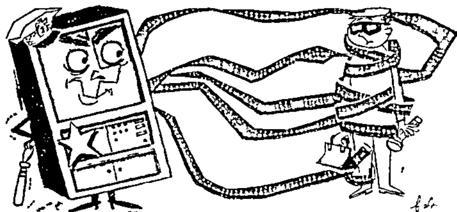
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Can Science Control Crime?



There is little a criminal can do against some of the newer crime-fighting instruments

by Gene Bylinsky

Condensed from The Wall Street Journal

An elderly safecracker currently contemplating scenic San Francisco Bay through the bars of the massive state prison at San Quentin owes his predicament to the electronic age. He was nabbed by an I.B.M. machine.

The burglar was tracked down through his so-called trade mark—hiding in a place of business during the day and attacking its safe at night.

After a rash of similar safe-cracking jobs puzzled police in southern California, an I.B.M. data-processing machine at the state's crime laboratory flipped through some 10,000 punch cards and came up with a dozen burglars who specialized in "inside" safecracking. With the search narrowed down, the police questioned suspects and found their man.

This incident points up just one way in which science increasingly is being put to work to fight and prevent crime. In their laboratories criminologists are developing new techniques and instruments to trap or deter criminals. And policemen are receiving broader and more intensive training to familiarize them with the new developments.

So far, however, such efforts have not stopped the recent increases in crime. In 1958, the latest year for which complete statistics are on hand, 8,182 Americans were murdered, 75,347 robberies took place and 270,965 automobiles were stolen; these and other major crimes were up 9.3 percent from the previous year. In the first nine months

Last year the F B I reports major crimes increased by 7 percent

F B I Chief J Edgar Hoover estimates that crime cost Americans $22 billion last year Many crimes go unsolved only a small fraction of stolen cars were recovered for example

I hate this crime doesn t pay stuff scoffs Dr Paul L Kirk a noted criminologist and professor of criminalistics at the University of California in Berkley Crime in the U S is perhaps one of the biggest businesses in the world today

The use of scientific devices of course is not exclusive with police they generally are available to criminals too Walkie-talkies and radio cars to cite two examples are being used with more frequency in carrying out crimes But frequently there is little a criminal can do against some of the newer crime fighting techniques and instruments

Consider Radar Guard an electronic alarm system made by the Bay State Electronics Corp of Boston Radar Guard is a small instrument that detects motion within its 50-foot reach Donald F Cutler Jr president of Bay State declares that "a mouse might not set it off but a cat will When the device is triggered it starts a bell or siren and flashing light that can be rigged up to go off on the spot or miles away in police headquarters

Put yourself in a burglar's position suggests Cutler "A blinding light suddenly goes on and a siren begins to wail We ve had cases where burglars jumped out of win dows breaking legs when that hap pened

Some 8 000 Radar Guards ar now installed around the countr

Closed circuit television sy tem are being installed in many reta stores around the country to spo shoplifters In these systems cam eras are hidden at strategic spot around a store and the pictures ar monitored at a central place by guard trained to detect suspiciou movements Now police in Salt Lak City are considering installation closed-circuit television in crime in fested areas of the city

In one important crime fightir field—physical evidence—micr scopic data that previously was to minute to be examined is being scr tinized by electronic microscop that enlarge objects 100 000 time far greater than the 2 000 tim magnification of conventional micr scopes Tiny specks of paint glas metal and dirt frequently provid the clues that tie a suspect to a crim scene or clear an innocent perso

A criminal can t help but leav physical evidence, or take it wit him says the University of Cal fornia s Dr Kirk "And physic evidence isn t ambiguous like huma testimony It either matches or doesn t

Criminals often trip over seem ingly insignificant evidence A youn thief, also a current resident at Sa Quentin, stumbled over a jar bright red paint while burglarizin

The Wall Street Journal (Feb 26 '60) ©1960 The Wall Street Journal 44 Broad Street New York N Y

a dime store Arrested as a suspect, he was found to have a tiny speck of red paint on his shoes The paint, analyzed by state criminologists, matched with the paint in the store s container

A piece of rope that tied three sticks of dynamite hurled into the yard of a Berkley Calif resident, yielded this string of evidence clinging to the rope were tiny round grains of sand and a few animal hairs This suggested to criminologists that the rope might have been used on a farm that had a fast flowing stream (since flowing water rounds sand grains) Recent dynamite purchasers were checked and one was found who lived in such a place he turned out to be the bomb tosser

Cashing in on the expanding market for crime detection equipment Minneapolis Honeywell Regulator Co maker of automatic control systems and instruments a few months ago introduced a series of elaborate security devices for industrial plants These include the Vitronic Eye a light sensitive instrument that can detect motion at up to 2 000 feet and automatically set off an alarm and the Sono Sentry, which works about the same way except that it s based on noise detection

Minneapolis-Honeywell is also offering a closed-circuit television door or gate-opening control panel system Under this system a guard at a central location can monitor pictures taken at a number of entrances to a plant, if an arrival is known to the guard or identifies himself satisfactorily, a simple press of a button can open the gate or door electrically Another Minneapolis Honeywell device is known as a security control panel It automatically receives signals if a fire breaks out in a plant or if a burglar tries to enter through a door or window which is guarded by magnetic switches The panel can protect areas up to 20 miles away the company asserts and can be monitored by one man in an instrument filled room

ONE AREA of scientific research that some criminologists think could conceivably have far reaching effects in crime prevention deals with the ionization of air The air we breathe is made up of molecules of gas—mainly oxygen nitrogen and carbon dioxide

Certain natural phenomena such as cosmic rays cause a small percentage of these molecules to lose or gain electrons those molecules that gain electrons are known as negative ions and those molecules that lose electrons are known as positive ions Both positive and negative ions are being formed constantly in nature

In recent years scientists have discovered that ionized air has a profound psychological effect on many persons Generally, positive ions seem to make people depressed or irritable and negative ions make them optimistic S J Curtis security superintendent of J L. Hudson Co, a large Detroit

store has studied ionized air with the thought that it might be used in big stores to discourage shop lifting

Curtis notes that in Germany ' there are periods of the year when they have what are called the Fohn winds They come in across the Alps During the period of the Fohn winds there is a serious increase in crime Analysis of these winds has shown that they have a high positive ioni zation The same probably occurs in Italy In Italy they have the pe riod of the Sirocco winds Again there is a tremendous increase in crime during this period

According to Curtis the police department in a large Eastern city has been conducting research on ionized air for the last two years The department believes there is a correlation between positive ioniza tion and crime he says Similar studies have been made by police in San Francisco with a similar con clusion Curtis asserts

' Some day we may be able to control crime by charging air with negative ions," Curtis says "A re- tail store can create negatively ion ized air fairly inexpensively Both Philco Corp and Radio Corp of America have poured a lot of money into ion research

Soon it will be possible to put ionizing equipment into air condi tioning ducts to negatively ionize the air in a store Indications are that this will reduce the problems of shoplifting and internal theft '

It remains to be seen however whether ionized air would deter a criminal who walked into a store with a carefully conceived plan for a theft

In the field of communications science has enabled police to send vital information from one city to another in a matter of minutes For example, a wirephoto system now links 27 law enforcement agencies around the nation, rushing blown up fingerprints between distant points for quick identification

Fingerprints still play an impor tant role in nabbing criminals but as one criminologist puts it, "only a fool commits a burglary these days without gloves " This shift in crim inal tactics has created a pressing need for new methods of identifica tion—another area of scientific re search

STEP INTO the University of Cali fornia School of Criminology t see one new identification techniqu under development White smocke lab technicians work at ' fingerprint ing blood

A tiny blood sample is placed o a strip of special paper inside a apparatus similar in shape and siz to a cigar box An electrical fiel breaks the sample down into com ponents making a distinctive pat tern on the paper The pattern varie with each individual s blood re searchers explain

Under present methods crime ex perts can determine only a person's blood group With the new que they hope to tell whether trace of blood came from a specin individual Criminals are

injured and leave drops of blood at the scene of a crime it is noted

Human hair too is coming under closer investigation as an identification means By scrutinizing a single hair criminologists already can tell a person s sex race approximate age and other information

To help assure the wider use of new crime fighting devices and the application of new techniques more states and cities are opening or expanding training centers for police men and detectives Larger cities long have provided training facilities for their policemen but in smaller cities rookie policemen usually have had to learn their jobs from older hands on the force and many of these veterans were not well informed on up to date procedures and techniques

• • •

New York last year became the first state to make training for policemen mandatory and New Jersey now is considering similar legislation California now provides funds to municipalities which accept state standards of training for their police forces and the Chicago based Council of State Governments recently called on other states to adopt such laws



"Atomic Spotlight" Used in Study of "Biological Timeclocks"

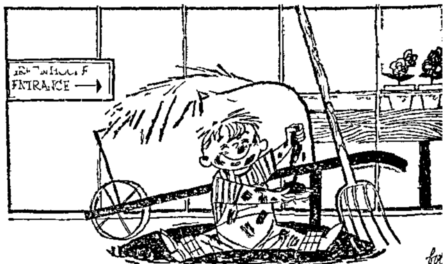
A giant atomic spotlight is being used by scientists at Argonne National Laboratory in Lemont Ill to study the physiological time clocks existing in all body cells

The spotlight actually the largest biological spectrograph of its type can aid in determining the reactions of living organisms to different wavelengths (colors) of light It was built by Dr Charles F Ehret of Argonne s staff

Recent evidence points to the presence in cells of chemical compounds that somehow regulate physical needs such as the desire for sleep Every complex living organism has a natural timetable that apparently is regulated by these mechanisms Dr Ehret said For example a person traveling by plane to a distant part of the world would be required to alter his eating and sleeping habits to conform to the different day night schedule and would feel uncomfortable until his 'time clock adjusted to the new environment

In order to learn more about the nature of this time clock mechanism Argonne scientists are exposing one-celled animals called paramecia to different wavelengths of light at various times They have found that the 'clocks can easily be reset by exposing the animals to ultraviolet Light

Once we understand the chemistry of nature s time clocks we will have a way to probe the mechanism that controls wakefulness and sleep in humans Dr Ehret said



The Scratch That Kills

by Edward R Bloomquist, M D

Condensed from Today s Health

TETANUS is a dying disease in the United States but it certainly is not dead

A yearly average of 501 Americans were stricken with this disease between 1950 and 1954 352 of them dying each year from its effects In 1955 the last year total statistics were available a welcome decrease occurred But despite increasingly effective treatment being developed for the problem 265 or 57 percent of 1955 s 462 victims still forfeited their lives

Often referred to as lockjaw tetanus doesn t have much of a chance to work its mischief in major injuries For these cases—gunshot wounds compound fractures, inc trial accidents—are usually seen a doctor and tetanus immunizat started before the germ has a cha to produce its deadly toxin

More than half of American anus cases occur with minor ii ries—rose thorn pricks insect bi cuts power tool wounds or spl ers These minor wounds are so c mon and inconsequential they not usually associated with teta until it is too late

We have to live with *Clostridi tetani* the lethal germ that cau lockjaw *It is a normal and imp* tant inhabitant of animal i tracts particularly those of h and cattle Its spores become with earth and subsequently

Today s Health (Feb 60) ©1960 by American Medical Association 535 North Dearborn S Chicago 10 Ill

found almost anywhere. No one is immune from the germ's effects, even those who recover from the disease it produces, unless immunity has been obtained by inoculation.

Death is always a tragedy. Death from tetanus is doubly so. With potent protection against its effects, the disease should no longer plague us.

Fortunately, a large segment of our population has been immunized against lockjaw. It is this group's immunity that has helped keep the number of tetanus cases reported each year at the figures previously mentioned.

Since 1950, nearly every child has been given "triple shot" (diphtheria, tetanus and whooping cough) by his family or school physician. Recently, a fourth injection, polio, has been added to this group.

Military personnel who have seen service since 1940 have also been immunized against tetanus, for war brings men into earthy contact with wounds that may be contaminated with tetanus.

On the surface, this should mean that a mass of Americans are immune to lockjaw.

But it doesn't.

War is hopefully a thing of the past, and the size of our military has been decreased. Children rapidly mature and leave the grade school age where immunization is stressed. Although both groups retain an immunity for some five years after their immunization series, this immunity tends to disappear unless a booster is obtained.

Preoccupied with other things, and often lacking the information that boosters must be continued every five years for life, many people have neglected to keep their immunity current. As a result, their bodies' ability to fight the tetanus germ begins to wane. When they need it most, they may find their body lacks this vital protection.

Some sections of the country have had more difficulty with tetanus than others. The South, for example, accounted for more than a third of all American tetanus deaths recorded in the last survey.

The majority of these deaths occurred among the nonwhite population. The heaviest toll here was among infants born outside hospitals, attended by non-physicians in less than sanitary conditions.

Tetanus, however, is not confined to one area. Nor are its victims selected from any particular racial group. Recognizing this, Morris County, New Jersey, physicians planned an all-out campaign last August to immunize as many of their fellow citizens as would cooperate.

During this same month, the Los Angeles health department warned that their city was facing its worst tetanus outbreak since 1950. They recommended everyone receive protection against the disease as soon as possible. For, although Los Angeles can offer its citizens the best in modern medical care, the dis[ease] was taking a regrettable toll. Of [illegible] cases occurring through Septe[mber] 1959, seven of the victims died.

"From the standpoint of deaths caused" Dr H H Cowper director of Los Angeles Communicable Disease Control Division recently commented 'tetanus toxoid injections are more important than polio vaccinations"

This was an interesting comparison For tetanus and polio have at least three things in common Both can be eliminated by controlled pro-



grams of mass immunization Both have continued to kill because immunization is not complete throughout the country And both are killers of youth Aged or debilitated persons are less likely to recover from an attack but children are more likely to be exposed to the germ

Over a period of 20 years 66 per cent of patients who died from tetanus were under age 45 The only downward trend significantly, was seen in youngsters under age five who have routinely received tetanus immunization

Unlike many of the killer germs tetanus cannot thrive in oxygen Its chance to work its mischief is lost unless the germ is carried beneath the surface of the skin and to an area of low oxygen content

If a wound is well cleansed and encouraged to bleed for a brief moment after injury tetanus is less likely to occur When the germ is imbedded, however particularly if it can grow in dead or dying tissue (burns, for example), ideal con tions exist for its growth Rapidl multiplying, the germ begins pro ducing a toxin which in a short tim travels to the brain

Unfortunately, a wound contam nated by tetanus lacks any speci characteristics In fact, the woun may heal long before tetanus ap pears Buried beneath the sk tetanus is unsuspected until th toxin s effects become apparent Th may happen within 48 hours of in jury Generally the earlier sympton occur the less the chance for su vival

When tetanus strikes, its victi (usually a male frequently a chil notices a beginning muscular sti ness and soreness This usually ha pens some 12 14 days after a wou is contaminated by the germ The symptoms indicate the toxin has a ready reached the brain In a sho time it becomes difficult to wal Headache and insomnia appear, fo lowed by convulsions

TO DOCTORS facing a life an death struggle a disturbing fa is always present This miserab aftermath of an otherwise simp wound would never occur if peop were immunized and would ke this immunity up to date

Protection against tetanus can b obtained by one of two methods a tive or passive immunization Th first toxoid stimulates the body t form its own defense and is valuab if taken before injury occurs Pa sive immunization (antitoxin) transient in contrast to toxoid, i

fects disappearing within six to ght weeks This approach is used fter injury has occurred to a person ot previously immunized with xoid

Toxoid is administered in a series f three injections The first two are iven a month apart the third a year ter To keep immunization current booster must be obtained in ap oximately five years If more than ve years have elapsed the entire ries should be repeated

When serious injuries occur a *oxoid booster is all that is usually* eeded to assure immunity When a ooster is given for an injury the ecessity of having another booster moved forward for another five ears unless tetanus contamination curs in further wounds

This does not necessarily mean at every scratch or splinter is an dication for a tetanus booster for e series if kept up to date tends protect against tetanus in small juries If there is any question, wever you should consult your ctor

World War II proved the effec eness of toxoid During this riod 2 800 000 wounded service en received booster injections of oxoid at time of injury, their im unity having been guaranteed by revious injections of toxoid

Only 16 cases of tetanus occurred Of these, six had missed their basic mmunization and there is some question about the others Toxoid has no unpleasant side reactions In a special study of 25,000 inductees checked by army physicians not a single significant side reaction was noted

Passive immunization is the only available protection when a tetanus contaminated wound occurs in an individual not previously immunized by toxoid Toxoid is of no value at this time because it takes more than a month for it to stimulate the body to build its own defense mechanisms Toxoid is given at the same time as antitoxin however since the latter loses its effectiveness in less than two months and tetanus may still be present *The toxoid series is al ways* followed through another in jection being given in a month and again in a year

ANTITOXIN has certain problems not present with toxoid Ap proximately 25 percent of persons who need its protection are allergic to the horse serum which serves as its base This sensitivity is always determined by a simple skin test be fore antitoxin is given A small amount is injected under the skin If allergy is present, a wheal sur rounded by a reddened area de velops Since allergy can be a seri



ous problem, the antitoxin must be carefully given in divided doses over hours, or in the severely allergic days And of course, valuable ti is lost

In addition to allergics the

others to whom toxoid immunization is especially important Although everyone should be immunized against this disease certain groups are playing with fate if they avoid this protection

Among them are

Children whose intimate contact with mud associated with a variety of recurring cuts and scratches makes them prime candidates for lockjaw Immunization is a must before school or summer camp as well as in infancy

Gardeners and do it yourself enthusiasts who are forever cutting scratching nicking or gouging themselves with tools contaminated with earth or fertilizers

Industrial workers whose power tools are frequently contaminated by tetanus germs and whose exposure to injury is greater than a age

Ranchers and farm , whose constant association horses creates an additional —allergy to horse serum from stant association with the ani *In addition* work involved in professions offers constant exposu to tetanus contaminated implemen

Military personnel In a nation emergency these men and women a the first to be called to duty the to be exposed to injuries in w tetanus thrives

Tetanus is a killer—an unnec sary menace that can be elimina by inexpensive immunization tainable at every physician s off Immunization can save your life

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No 'Towering Crags' on Moon?

A NEW PHOTOGRAPHIC technique has shown the surface of the moon is far less rugged than previously believed The photographs are part of the Air Force s Cambridge Research Center lunar exploration program



The project begun in February 1958 and resulting in about 5 000 moon photos makes use of timing instruments to record the march of shadows from various prominences across the face of the moon

Accord ng to Charles F Cam the program s d rector the pict generaly indicate that steep slope tower ng rock faces are absent from lunar surface

Campen sa d that a man standing the surface of the moon would se horizon without the immediate tow ing crags often portrayed by art who worked from previous concepts the moon s face The Air Force

England and the Pic-du Midi Obser tory of the University of Toulou France cooperated in project

It's Twister Time, Again

; Weather Bureau hopes to find a way to control tornadoes



by Ann Ewing

HE WEATHER BUREAU is this year intensifying its search to find a ıy to control tornadoes

Doctor F W Reichelderfer, Bu au chief his agency, and other eteorological organizations are epping up their research to find out hether it is possible to control or odify tornadoes so their paths ıuld be changed or so they could be tally suppressed

Weather scientists are also look- g for better methods of forecasting hen and where tornadoes are likely) occur Each year the predictions f areas where conditions are ripe ɔr tornadoes to strike show greater ccuracy, but Weather Bureau meteorologists will not be satisfied until pinpoint forecasts are a reality.

The tornado season is now at hand Some 68 percent of the U S. total occur during the four months between April 1 and July 31

Most twisters strike between noon and midnight, but they can occur at any hour

Definite weather patterns are needed to spawn tornadoes The viciously rotating column of air drops down from a line of thunderstorm clouds to level any structures in its path It is a gray or black funnel shaped cloud that spins like a top When nearby, a tornado sounds like the roar from hundreds of airplanes

Whenever t e air ma one moist, r warm, the o dry and cool for sup

acy, the stage is set for stormy weather If other factors are right, the resulting thunderstorms may give birth to a tornado's whirling funnel

Squall Line

One factor is a big temperature difference between the tropical air and the colder air, such as temperatures in the high 90s ahead of the cold front in the 60s behind it Such a sharp cold front usually means a line of thunderstorms, or squall line is established

A pulse, or 'pressure jump line" is sent out ahead of the squall line most weathermen believe The pulse sets up a vertical motion to help release the pent up energy of the warm air

High in the atmosphere there is often a swiftly moving jet stream, usually from the west, bringing with it drier cooler air

The required conditions occur much more frequently in some areas, particularly the country's midsection from Texas to Ohio — a section



known as "tornado alley —than in the Northeast or Far West

The width of the path over which the tornado funnel causes such damage averages less than 1/4 of a mile, and the length is usually 10 to 40 miles

The destructive effects of tornadoes are terrifying

Tornadoes can lift freight Strong buildings are torn apart scattered about like kindling wo Large trees are uprooted and bark stripped off People and fa animals are whirled through the and then dashed to earth Str and slivers of wood are driven d into boards and posts

From such effects, weatherm have estimated the wind spe within tornadoes are as high as miles per hour

Safety Measures

The safest protection from an proaching tornado is to be un ground, such as in a tornado ce When underground protection is available, stand against the in wall on a lower floor of a stro reinforced building In homes, corner of a basement toward the nado usually offers greatest saf particularly in frame houses

In open country, move at r angles to the approaching torn If there is not time to escape, lie in the nearest ditch or depressio

The Weather Bureau alerts public to tornadic conditions by suing a tornado forecast This is advance notice distributed thro newspapers, radio and television tions specifying areas where one more tornadoes can be expected occur The usual size of such a fo cast area is about 20,000 squ miles equivalent to an area miles long and 100 miles wide

The forecasts are issued to al volunteer storm reporters, police a the public to watch for tornadoe

ie sky becomes threatening Preminary action can be taken so that place of safety can be reached uickly if it becomes necessary

A tornado warning is an announceient that a tornado has been sighted nd mentioning localities in the torm's path where immediate safety recautions should be taken

The importance of providing adance warnings to help avert catasrophes resulting from local storms an be appreciated when it is relized that the annual loss in the J S from hail, tornadoes and thunierstorms is estimated at many milions of dollars for each of these ypes of severe weather conditions

To help provide detailed advance varnings networks of observers have been organized in some communities n areas most subject to destructive ocal storms

Also helpful in spotting tornadoes s a network of radar stations

Lightning discharges known as 'sferics' from a contraction of the word atmospherics, give another

methods of tornado detection are the Air Force the Federal Aviation Agency and the National Aeronautics and Space Administration Each agency is contributing planes and equipment Dr Reichelderfer said

Besides airplanes rockets and on the spot detecting devices meteorologists use every possible research tool to study the swirling storms Their methods range from miniature tornadoes made in laboratory boxes to complex mathematical formulas fed into electronic computers

Path Is Narrow

One reason so little is known about tornado formation is the relatively small scale of their occurrence The distance separating present Weather Bureau operating stations is about 200 miles, while the storm's destructive path often is only about 1/10th that distance Even under good conditions, therefore, it is unlikely that



a trained meteorologist would observe the birth growth and death of a twister's funnel

To fill this gap, the Weather Bureau is developing a stepped up spy system

Ground observations from stations in a close network have yielded some information about squall lines, the long lines of thunderstorms and gusty winds from which the tornado s funnel swoops to the ground

A sudden rise in barometric pressure for instance always accompanies squall lines Weather Bureau scientists have developed an automatic alarm device that signals when such a 'pressure jump line" crosses over it Many of these devices are now in operation 24 hours a day in "tornado alley"

Flying radar equipped simultaneously into the squall and more ground based radar are other prongs of the spy

If a tornado develops in one of the squall lines that has been thoroughly probed weathermen believe they could detect in their records the factors that made the tornado bearing squall line differ from those in which no twisters occurred

If one or more unique features that precede tornadoes were found then the atmospheric instability resulting in tornado formation might be checked by man before the destructive clouds start rotating

Some kind of control is consi ered possible if more were kno about the basic physics of c how and why they form Seedi the clouds with chemicals might be of some benefit Other me ods in the discussion stage inc the use of large oil fires or very m explosions

Behind all these suggestions is idea of dissipating the storm s ergy before it takes the form o whirling funnel



List Three Heart Disease Factors

THREE FACTORS appear to influence the answer to the often asked question What kind of people are likely to get heart disease?

A research program known as the Los Angeles Heart Study now in its tenth year shows the three factors are

1 An elevation in blood pressure
2 A family history of heart disease
3 Elevated blood cholesterol

The study has been carried out under the direction of Dr John M Chapman of the School of Public Health at the University of California Los Angeles together with Drs L S Goerke and Leo G Reeder assisted by Mrs Anne Coulson and others

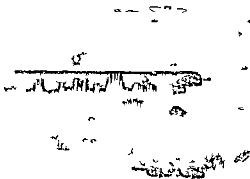
The project consists of a study of 1 859 men now or previously employed

They received detailed examinati between 1950 and 1954 and since t time have been contacted annually determine whether or not heart dise has been diagnosed by their perso physicians

During the decade 135 have d from various causes including 59 fr coronary heart disease A total of m than 100 cases of this disease has curred including the fatal cases T incidence is highest among the n who had high blood pressure a fam history of heart disease or eleva blood cholesterol

There did not appear to be any r lationship between the type of wo or socioeconomic status of the in vidual in the development of hea disease The disease struck alike amo those in executive positions and in u skilled labor among those in sedenta jobs and those involving heavy

Do you reveal yourself by what you tell? —in boasts? coy hints? shy half-truths?



Why We Talk About Ourselves

by Barbara Moon

Condensed from Maclean s Magazine

ONLY MAN of all the animals, is abashed and secretive There are things he cannot or will not reveal about himself even to his vital kin—his parents his mate his brothers and sisters, his children For the rest of the world he edits himself with still more compulsion and cunning In fact everything he thinks feels believes and remembers he also considers None of Somebody s Business

Yet he seems also possessed of a furtive urge to make himself known In freakish hints in contagious bull sessions in aggressive boasts in coy parables or jests that cloak truth in shy confidences and in tortured con e record straight It s as though the finally intolerable thing—and never mind his privacy—is to feel himself misunderstood

Why do these twin urges war within him? What kinds of things do people conceal about themselves? Why? Who do they talk freely to? Who should they talk freely to? How much should they tell?

Most people are only fitfully aware that there is an inner clash The sole symptom may be a tiny moment of puzzled irritation or dismay Why on earth couldn't I come right out and admit the truth? ' or, on the other hand ' Now what made me tell that? Or it may catch their attention by the anomaly of dislike for the confidante that often foll the luxurious heart to heart talk

Ever since Freud, students of the human personality have been convinced that our patterns of self disclosure are crucial In fact classic psychoanalysis is based on the premise that mental sickness resides just in what we keep secret—and that the cure is to talk about it And talk And talk

Yet, talking readily even about personal things is not total self disclosure Psychiatrists know that some material is so painful for a patient to dig out of himself that he will fall into lies and abuse spend whole sessions in stubborn silence or threaten to discontinue treatment rather than put it into words

While most people are eager to talk about themselves they will keep from one person what they will reveal to another A man will speculate about the new blond in the office with his co workers but not with his wife He will tell his wife details of his college carousals that he would never tell his parents

He will tell his parents he is having to borrow money but will do all he can to hide it from his golf partner He will indulge in florid accounts of his past to his golf partner but not to his son And he will tell his son of his love for poetry though he thinks he would sooner die than admit to his co workers that poetry can still move him to tears

A little over two years ago Sidney Jourard an associate research professor at the University of Florida, undertook studies of what people are willing to reveal—and to whom The following are some of his findings

Mothers are generally the closes confidante of unmarried young peo ple sons or daughters,

Females also confide in their gi friends and males in their me friends but females tell least abou themselves to their beaux, and mal to their girl friends,

Married men and women transfe their confidence from parents t spouse but don t tend to increa the number or depth,

Most people will talk willingl about their attitudes, tastes ar work the majority are retice about their financial affairs the personality and their bodily fun tions and appearance

Women disclose themselves mo than men

3 Basic Drives

The literature of the human pe sonality suggests there are at lea three drives that prompt people t talk about themselves

The first—and the most tim honored—is *catharsis* that gush o relief [illegible]
fessio
heard
confession that he'd cheated as quiz contestant on the TV quiz "Twenty One" They also heard h say, "This is the first time I ve fe happy for three years" Many peo ple have found that secret guilt is blackmailer and that publishing th blackmail themselves is the only re lease from a frightened eternity o paying

The second motive could be called *hibitionism* It is the need for estige, the need to make a mark, get attention sympathy love
y
ı

oms boasts are of this order It is motive that s capable of sweeping ide even the simplest caution Artie Newman a member of the torious Birger gang that terror :d southern Illinois in the twen :s once started trading anecdotes ith a stranger on a transcontinental ain The stranger talked very big out guys being bumped off and her guys taken for a ride New an began topping him The stran r was a reporter Pulitzer prize inner John T Rogers of the *St ouis Post Dispatch* Newman and n of his gang were convicted of the o murders he d bragged of to ogers

The third motive is *self under anding* It s as though putting elings into words helped them ake sense begin to seem normal he confidante s reaction can com lete the process If he is un ocked unsurprised unpuzzled the confider feels confirmed in his self analysis and freed of his fears of being unattractive or—worse—un natural Most heart to heart talks and bull sessions send the talkers home a little more sure that what they are is after all all right

• • •

The need for recognition may keep people mute as well as driving them to talk they will hide infor mation about themselves that might lower their prestige or prevent their raising it This seems to be the mo tive behind the universal—and initi ally puzzling—reticence about in come People will tell how they voted in the last election how they cheated on a college exam and why they nearly committed suicide But to have others know the s ze of their salary seems as threatening as though it were in literal truth the measure of what they re worth

There is one other area of reti cence so deep rooted and instinctive that it seems linked with a kind of self preservation This is the ex perience of mental anguish or out rage so severe that it cannot be faced

A book editor said recently The

one thing I've never been able to discuss with anyone was something I saw once as a child It was some one torturing an animal in an unbelievable way It's as though if I put it into words it would make it real"

In the same way soldiers returning from battle will say, 'I don t want to talk about it'

Humiliation seems to tap the same self protective instinct Annette Garrett, a social worker reports the case of a boy who was being counseled because he d quit school The boy admitted without probing that he d once got into trouble for pilfering, but only with skillful and patient questioning and after many false starts could be blurt out his most painful secret he wouldn t go to school because his mother had made his underwear from her own cut-down bloomers and wouldn t risk being seen in them in the washrooms or gym locker room

Why didn't the boy tell his mother instead of the counselor? 'She'd feel real bad because she knows we haven't any money to get underwear,' he explained

The decision to spare someone is part of the urge to be worthy of approval For, though the evolution of inhibitions is infinitely complex, one way of describing it is as a gradual process of learning what people do not *want to hear* and obediently keeping it from them

It starts in babyhood If what the child reports about himself brings too much anger from his parents he will stop reporting it

So he learns to suppress—and feel guilty about—his destruct rages his jealousy, his curiosity occasional impotent hatred of parents, his lies, lusts, cruelties stupidities It is "sins' such as t —smothered, festering unackno edged—that may bring him to psychoanalyst's couch in later life'

Soon the child learns to screen h confidences not only according what behavior will bring ap or displeasure from his parents bu also according to their views what is welcome to the world large "We don't tell people mu my s age "We don't say granny had to go to a nursi home' or, simply, 'We don't t about that!"

Teen-Age Talkers

The child also absorbs his paren explicit training about expressi himself A boy will be taught th it's not manly to complain A g will be taught that her traditior role is to listen sympathetically

By adolescence, most childr start to find outlets for the con dences they feel they can t bri their parents For the urge to worthy of approval wars with tl wistful need to be *accepted, su* problems, fears and all just as the are

They test their friends with eve narrowing generalizations for sign of shock or ridicule or apathy The blurt out the contraband tho their mother has a martyr comp' they ve decided or she has this me habit of sitting tight lipped

ickly at dinner without ever say ; what they ve done wrong Then the cathartic realization that ch disloyalty is not just permis ile but epidemic in the whole oup Here they feel they can andon pretense

But even as his friends help eman pate him the friends themselves rn into tyrants The intelligent l must never talk about her irks or she won t be popular The y must not admit he likes the ench teacher whom everyone else nsiders a fool The taboos differ th education income level race ckground religion locale but by e time they reach their 20s most ople know what others expect om them

They present it economically and ficiently trying to volunteer noth g that would intrude on say the oss s concept of a secretary the TA s picture of a charming matron e golf club version of the rugged ale

For the most part people find that lk of their personal problems is nwelcome particularly outside the ome Don t tell me your troubles perhaps society s most devastat ig sanction

Confidences In Marriage

Tangled in the cat s cradle of ac uired reticences and imposed bans ost people keep looking for some ne to emancipate them from the roup just as the group once eman ipated them from childhood They ook for someone with whom they an just be themselves

Ideally this is the person they marry but that s not always quite the way it is Even in well adjusted marriages says sociologist Erving Goffman We expect that each part ner may keep from the other secrets having to do with financial matters past experiences current flirtations indulgence in bad or expensive habits personal aspirations and worries actions of children true opinions held about relatives or mutual friends etc

Ill adjusted marriages not only foil the basic needs for self expres sion but themselves create problems and emotions that cry for outlet

Sometimes the partners can tell each other the truth about these only in moments of anger so convulsive that it sweeps away inhibition Sometimes not even then can they communicate

It s when all appropriate confi dantes seem to threaten the punish ment of anger distaste or refusal that people turn to strangers—to the hired listeners like hairdressers barkeeps or cabbies the profes sional confidantes like poll takers or reporters or ghost writers or to the motherly Mary Worth figures who offer their interest and their ear

They re neutrals so they are non threatening and one way or an other even if it s only because you re paying them they re guaran teed to hold still long eno listen Otherwise they fall p short of the social scientist s tion of the ideal confidante

As Jourard the pionee

disclosure research, puts it, "Actively accepting, empathic, loving, nonpunitive responses—in short, love—provide the optimum conditions under which man will disclose, or expose, his naked, quivering self to our gaze" Psychiatry's substitute is, of course, the psychoanalyst

Does Talk Help?

Does telling strangers—even psychoanalysts—do any good?

What it depends on oddly enough is how hard it is to tell The man who buttonholes the barkeep his best friend, his golf partner his sympathetic secretary and a whole series of neighbors to say his wife doesn't understand him is doing nothing for himself—and boring his fellows into the bargain

For an interesting phenomenon is emerging as a new generation grows up, schooled in easy self expression and the commonplaces of Freudian thought, psychoanal is beginning to take longer Davi Riesman, the U S sociologist wh wrote *The Lonely Crowd*, notes th when talk along these lines com cheap, analysis is often "intern nable"

It seems that only when telling a shock—an emotional drama in self—does it do what is therapeuti make us be ourselves and take look at what this is

The man who, in agony, blu out his nightmare fear of being coward in battle is stumbling on part of himself and facing it for first time

The woman who, in love, confes she is ashamed of her body has ab doned glibness and pretense so tl with help she can change herself

For true mental health lies not words but in self understanding a in growth It's just that sometin the words help

Boiling Baby's Bottle Not Always Necessary

A Philadelphia pediatrician says that it isn't always necessary to boil baby bottles

In an effort to relieve young mothers of all possible excess work Dr Carl C Fischer head of the department of pediatrics at Hahnemann Medical College developed a safe and simplified method of infant feeding His method of using evaporated milk and hot tap water from a city source received an enthusiastic response from volunteer mothers says Dr Fischer Using hot tap water in the mixture saves time as it eliminates the need of reheating the bottle before feeding The gains in weight of infants fed formulas so prepared showed no statistical differei from those who received sterilized f mulas There were no evidences of fection in either group

Bacteriologic studies showed tl single feedings prepared from ster those similarly prepared with homoge ized grade A milk showed an increas bacterial account

Doctor Fischer emphasizes that method should be confined to sing feedings and all unused portions each bottle should be immediately carded



by Jean Besse

Condensed from The Unesco Cour er

HOW MANY POSSIBLE HANDS IN BRIDGE?

53,644,734,400,000,000,000,000,000,000

ASK an electronic calculating machine how many possible hands there are in the game of bridge It will be stone deaf to the question First because the machine does not know what you are talking about Second since it has no intelligence of its own (and that is why the term brain is a misnomer) it is quite incapable of posing a problem much less of studying one To pose a problem ...

human brain

On the other hand you can very well ask a *mathematician* how many possible hands there are in bridge After a few moments' thought, he will tell you that the problem is one of calculating the permutations (the total number of changes in position or order possible within a group) of 52 objects (the cards) distributed in four groups (the 'hands) of 13 objects the permutation of the objects within each group being immaterial

In mathematics, the notation 3! (known as factorial three) is the result of multiplying 1 x 2 x 3 Likewise 4!=1 x 2 x 3 x 4, and 5!= 1 x 2 x 3 x 4 x 5 and so on The mathematician will tell you that the permutations of 52 objects is equivalent to 52! (that is, the pr t of multiplying 1 x 2 x 3 up t But we must also divide th ber by the permutations wi of the four groups of 13 is 13!, since the permutat

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Jean Besse of Switzerland is a noted mathematician working with UNESCO's International Computation Center located in Rome He is also a well known bridge champion of international standing

in each group are immaterial The number we are looking for is there fore

$$N = \frac{52}{13! \times 13! \times 13! \times 13!}$$

At this point and at this point only one could turn to the electronic calculator There are a hundred tedious operations to be done

The machine is there just for that

But it is necessary to tell the ma ch ne precisely what is expected of it For this a detailed program' must be worked out and recorded (assimilated) by the machine After that you simply press a button and the result comes out a few seconds later That is the miracle There is nothing supernatural about it but it is a sensational accomplishment of technology

For the problem we are consider ing I prepared a program" for the new Computer *Gamma Tabbour Bull*, built *in France* which took me one hour to work out The print answer emerged about a second a the button had been pressed ' number of possible hands in bric

53,644 *quadrillion*

Spelled out, this figure precise on for the first nine digits is written

53 644 734,400,000 000 000 00(000 000

As for the second question tl possible distribution of cards to one player," the calculati is simple and can be made "by han with pencil and paper in five m utes The answer

635 013 559 600 hands of cards

To 'program' this calculati and pass it through an electro computer would be a waste of tin It is not worth the trouble to a the machine to do a job that is t simple Just as it is pointless to u a jet plane to cross the Cham Elysees

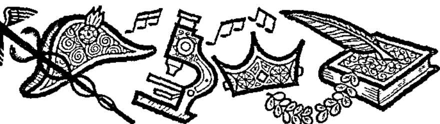


"Sea Serpent" May Be Giant Eel

The "mythical sea serpent' may not be a myth It may in fact be a new species of giant eel

According to a recent report to the International Oceanographic Congress biologists have found a species of eel larvae six inches long instead (the usual fraction of an inch

This might mean that there are grown eels 100 feet long To an trained observer such a creature coul be mistaken for a "sea serpent'



ledical Symptoms Of History's Great Men

by Leonard Wallace Robinson

Condensed from The New York Times Magaz ne

ꞏN THE PAST 50 YEARS the progress of medicine has been fantastic ıe knowledge acquired in these five cades far outweighs the accumu ed knowledge of the five thousand ars that went before

From their lofty modern pinnacle ctors look back in wonder at how ... to- n a iag- ıstics of yesteryear With an eye straightening out the medical rec d these doctors, using up to the- inute medical knowledge, have re- ewed the signs and symptoms of sease in many famous historical ersonages and rediagnosed them ompletely

The results are fascinating Often ıch medical reassessment throws n entirely new light on a famous ersonality, his motives, his success r failure, his historical reputation o many physicians are now engag- ng in this avocation that one doctor felt it should have a name of its own He dubbed it 'historio somatics or, for diseases of psychological origin ' historio psychosomatics '

One of the most interesting con tributions from this recent medical avocation is a rediagnosis recently made of Napoleon Bonaparte s manifold symptomatology

Napoleon's Slowdown

The pazzling thing about the Little Corporal was his mental and physical slowdown in his forties Physicians of Napoleon s era as cribe this to two factors They be lieved that Napoleon had stomach ulcers which caused him to have chronic "stabbing pains," and that he suffered from a contagious skin disease which he contracted during one of his campaigns The suffering from these combined afflictions helped to deflect the emperor ... his destiny His energies were ... ther sapped, according to ...

Using today's knowledge, physicians have reassessed the ailments of famous personages

of the 19th century, by Napoleon's overeating and lack of exercise as he grew older

There is little to such speculations, according to Dr James Kemble, famous English surgeon and a confirmed somato historian Bringing forth new evidence, Dr Kemble says that there were two major physical causes for Napoleon's indecision and the paralysis of his will The first was a persistent acute infection in his upper urinary tract resulting in bladder trouble The second was Froehlich's syndrome a disturbance of the pituitary gland

The type of bladder trouble Napoleon had was a debilitating affliction The apparent paralysis of will that delayed him on the eve of Borodino was directly caused by it, according to Dr Kemble Due to the same cause was Napoleon s unfortunate hesitation in ordering a retreat from Moscow while there was still time to get his army out of Russia and across the Berezina before the winter blizzards set in

The bladder trouble was transient however Napoleon recovered from it It was Froehlich's syndrome that was his Waterloo This pituitary condition is a result of lesions of either the pituitary or hypothalamus It is characterized by obesity and an affliction of the generative glands 'and it caused Napoleon to have long spells of indecision and of moral and physical prostration in the years when he needed his very best energies

The New York Times Magazine (Feb 7, 60) ©1960 by The New York Times Company Times Square New York 36 N Y

Even so, he might have done better at Waterloo if the medi[cal] breaks had gone his way On the e[ve] of that great battle, however, came down with an acute and agon[iz]ing attack of hemorrhoids This w[as] the final straw and led to his be[ing] fatally indecisive at the decisive m[o]ment of his history

About the contagious skin aff[ec]tion and the ulcers Napole[on's] "stabbing pains" were proba[bly] psychosomatic, not ulcers at all, [and] his famed 'scabies" was unquesti[on]ably a nervous inflammation of [the] skin brought about by the e[nor]mous psychic strain under wh[ich] he labored

Darwin "Bitten by Bug"

Another great man who acc[ord]ing to modern somato-histori[ans] was medically misunderstood [was] Charles Darwin The famous ev[olu]tionist though vigorous and heal[thy] during his young manhood, bec[ame] chronically ill at about 25 F[rom] then on he virtually always [was] physically weak He would bec[ome] exhausted by three hours' d[esk] work Even a little excitement m[ade] him ill and public appearances t[ied] his stomach in a knot

Some physicians of his ti[me] thought that Darwin had a pep[tic] ulcer, others believed that he wa[s a] *hypochondriac*

Neither of these diagnoses w[as] correct, says Dr S Adler of [the] Hebrew University of Jerusale[m] Assessing all the evidence and ad[d]ing up all the symptoms, Dr Ad[ler] has concluded that Darwin suff[ered]

from an infection of protozoa picked up at the age of 25 during his trip to South America aboard the *Beagle*

Darwin himself wrote that he had been bitten by the great black bug of the Pampas and in his *Journal of the Voyage of H M S Beagle* described in detail the insect that had bitten him Dr Adler identified the bug as *Triatoma infestans* Seventy percent of these bugs carry the protozoa called *Trypanosome cruzi*

An infection caused by the bug results in a swelling of the eyes high fever and cardiac and nervous symptoms Technically this is known as the Chagas disease It can persist for years and produce severe and variable physical symptoms

Doctor Adler believes that all of Darwin s ills can be laid at the door of this disease With good health somato historians speculate Darwin s achievements great as they were might have been even greater

Investigators using all of modern medicine s varied disciplines may yet restore at least partially the good character of many historical villains Take the Emperor Caligula for example

Today s physicians have noted that the greatest criminal in history had as a young man been as pleasant and friendly and uncriminal as the very nicest of Roman emperors All of his criminal activities started after his wife had given him a love potion probably *cantharides* An overdose of this poison toxicologists point out could produce a toxic insanity that might account for Caligula s wicked behavior

Modern medicine too has thrown new light on the actions of Henry VIII Medical contemporaries of Henry saw no connection between his excessive behavior and his physical condition Somato historians, however conjecture that all of Henry s story may add up to a single diagnosis—a syphilitic infection or infections of which he was unaware

Henry s many wives and some of his impatience with them may be explained by his frantic attempt to do his duty by giving England a healthy male heir to the throne But his wives tended to contract his disease and as a result in most cases suffered from chronic spontaneous abortions In two cases at least doctors suspect the children contracted syphilis congenitally Elizabeth and Edward VI escaped unscathed

Today s physicians point to little noted aspects of Henry s relationship with Catherine of Aragon for diagnostic confirmation Her first pregnancy ended with a stillborn daughter A second child died within 52 days A third was stillborn Mary Tudor of course grew up But her portraits show her to have been say doctors who have studied them carefully a congenital syphilitic

Nelson Always Seasick

Sickness may stop great men or slow them down in mid career and thus change history But it can also make great men according to psychosomatic historians As an example they point to Lord Nelson

Nelson s ills were as legenda

his achievements As a boy he was sickly and frail When he went to sea at 12 it was over the protests of a nautical uncle who wrote to the boy s father, ' What has Horatio done who is so weak, that he above all the rest, should be sent to rough it out at sea? '

The sea never agreed with Nelson Not only was he always seasick but he contracted hosts of ailments on his voyages He had constant dys pepsia he contracted a chronic ulcer, he caught malaria at the first whiff of the tropics when he was 16 and it lasted for years He had peripheral neuritis of the left arm and leg, and he gradually acquired a fantastic assortment of battle wounds and lost an eye and an arm in service

Nelson was in moderate good health on land only but he stayed there just long enough to get suffi ciently well to go to sea again One prominent psychiatrist recently summed up his medical story in these words

"Nelson s greatness was undoubt edly shaped by his wretched ill health His lifelong struggle against a variety of physical misfortunes put the steel deep into his soul, gave him the psychological conditioning necessary to military greatness If somebody had cured him early of all of his complaints he might have been second rate "

It has often been stated that there is a relationship between genius and disease The literary world has al ways been particularly fond of this idea In our era the theory has been put forward by the critic Edmu Wilson in his book, *The Wound a the Bow*

Weighing the medical merits this belief, Havelock Ellis made study of 1,034 geniuses in Brit history He found that more th 100 suffered serious ill health dur their active lives and that 57 these individuals had severe em tional disturbances

On the other side of the argume modern medical authorities po out that this rate of physical a emotional illness among the grea no larger than among the obscu ' But even if it were larger, ' sta one "it would not mean that sickness caused the greatness, b only that the great got sicker m often than the ungreat "

Roster of Tuberculous

According to the most rece speculations, however, one disea may prove the exception It is tub culosis

The roster of the tuberculo great reads like a *Who's W* through the ages The names Cicero, Chopin, Cecil Rhodes El abeth Barrett Browning, Kea J A Symonds and Robert Lou Stevenson represent the meagere sampling of sufferers who achiev fame, and some of them might ha done so because they had lu trouble

Of all man's mortal diseases tube culosis is perhaps the only one th ever became fashionable to have I the 19th century so many famou writers contracted the disease th

it was identified with literary genius The phthisic countenance and manner became so desirable that even robust Alexander Dumas made serious attempts to appear frail and consumptive

Lord Byron gazing at himself in the mirror said to another poet in 1820 I look pale I should like to die of consumption And Dumas was reporting quite faithfully when he wrote in his memoirs Every body was consumptive poets especially it was good form to spit blood after each emotion that was at all sensational and to die before reaching the age of 30

Nineteenth century medicine ridiculed the idea that there was any connection between the disease and genius and even modern medicine does not claim that tuberculosis is

agent to genius It can certain doctors say trigger the creativity of a latent genius or cause a genius to bloom more brightly

Evidence from history they state bears out this contention Ancient Greek doctors noted the feverish urge for accomplishment and the terrible terminal optimism of tuberculous patients and called these reactions phthisic ecstasy

The testimony of the artists themselves has been weighed carefully by the somato historians The American poet Sidney Lanier had written I am shortly to die All day my soul has been cutting swiftly into the great spaces of the subtle, unspeakable deep, driven by wind after wind of heavenly melody ' Lanier s exhaltation increased and on his deathbed he wrote a great poem called *Sunrise*

John Addington Symonds spoke of his tuberculosis as ' a wonderful Indian summer of experience and felt life richer his intellectual perceptions sharper and his literary style more masterly as the result

Coming right up to date, a prominent tuberculosis specialist of today notes that T B patients particularly young talented individuals display enormous intellectual creativity Despite the fact that it hurts their physical condition they keep on working and produce their best works

Medical Theories

Two medical theories are advanced to explain why tuberculosis may produce genius

The first is that though the sufferer from the disease often runs a fever there may be no gross toxemia present in other words the subject is feverish but otherwise feels fine Chronic low grade fevers according to some medical authorities can sharpen perception and speed up intellectual processes

The second theory is that the disease creates anoxia (lack of oxygen) in the prefrontal lobes of the brain This causes a suspension of critical faculties and the now unhampered ' creative unconscious of the can pour forth its stream of meditated art without inhi

Medicine cannot of

the full light of modern science to bear on patients of yesteryear As passionately as today s doctor might like to use diagnostic instruments they must content themselves with far less usually accounts by con temporary experts or even lay ob servers A modern diagnosis of a historical patient generally must be speculative—and sometimes the more stimulating for that

One ophthalmologist for example would not accept as fact that a man as brilliant as Xerxes could have committed his entire fleet against the Greeks at Salamis for the reason historians usually give that is that *he was duped by Themistocles*

After all this specialist reasoned Xerxes had a perfect view of the situation from his seat on the rocky cliff that looked over sea borne Salamis A school boy could see that the Straits of Salamis were too small for his huge fleet to maneuver in

But that was just the point—Xerxes the ophthalmologist argues could not see what a schoolboy could for he had seriously impaired vision and the most decisive naval battle in history may have been lost for that reason rather than any other What is more proper spec tacles might have saved the day for the trouble must have been myopia or astigmatism according to ophthalmologist

The aim of the somato- is to come up with a differen diagnosis more in keeping with symptoms of his historical than his ancient colleague s Th exacting work even if no longer gerous to the patient for not must the symptoms be exam but the source reporting the sy toms must be scrupulously weig As one doctor put it recently, torial diagnoses develop a ph cian s humility '

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Much that is important to his *takes place* offstage And every corder of the past must at po decide on the true motives bel the shapers of great events The l orian of the future will do well fore making any final decision the whys and wherefores of a mous person s actions to arm h self with his subject s medical cl and consult a doctor A rediagn in the light of today s medical kn edge may put such a personage his effect on his times in an enti new perspective





s uuy each infant is given about 15 drops of cine by mouth on the day of b rth or on the next day Afte few months tests w ll determ ne whether or not the vaccine l provoked the production of ant bodies in the infant

RP—chemical free photog aphy—may someday police e earth from satellites

'hotos that Ielt and Freeze

by W ll Jonathan

Condensed f om Saturday Rev ew

A PICTURE FILM that melts and freezes and melts again like in estructible snow and can shoot con inuous movies of the earth from ar ficial moons adrift in the sky

Because these pictures are de ailed photographs—they can even e taken in full color and because hey run in swiftly timed sequence hey ultimately will enable constant urveillance of the face of the globe anything that moves at any point of a n f

he copies are made below the orig nals above can be melted away to nake room for new photographs

There is an almost magical sound o all this but neighbors of Bill Glenn along Indian Kill Creek in Glenville N Y will hardly be sur prised A person who dares to design a house to make the living room com fortable for musical notes—and still ends up with a very nice house—is bound not to stop there

Bill did build the living room for the music He put the speaker of his phonograph in one corner, bounded the corner on one side with a 28 foot window of sheet glass and built a large stone fireplace on the other side

These hard surfaces threw the tone wholeheartedly across the room and into bookshelves and open spaces deliberately phased to allow the sound to die away gracefully

Aside from being slanted to fit the roof the ceiling was cushioned to drink in what otherwise would be echo and clash The overall effect is one of intimate understanding be tween the house and the family in side it

There is a workshop in the Glenn cellar where Bill tinkers in the eve nings Here Bill tries to pass on to his two sons Douglas (seven years old) and Ross (five years) what ever they will take of the scientific method he acquired from his father in Birmingham Alabama

Papa Glenn was a physicist at heart and his dark haired boy (christened William Ellis at his birth in Georgia s capital 34 years ago) inherited the tendency

Bill developed his invention in the General Electric Co laboratory within easy motor drive of the Glenn home But unlike many GE inno vations Bill s revolutionary ph film is not a product of sci teamwork Bill is a lab lone and his film is the offspring o one extremely ingenious min

S nday R ew (Feb 6 60) © 1960 by Sa u d R w Inc 25 We t 45 h S New Yo k 36 N Y

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by Will Jonathan

Condensed from Saturday Review

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Bill developed his invention in the General Electric Co laboratory within easy motor drive of the Glenn home But unlike many GE innovations, Bill s revolutionary photo film is not a product of scientific teamwork Bill is a lab lone wolf and his film is the offspring of one extremely ingenious mind

Although the idea of pictures that melt and freeze may seem near the forbidden rim of the esoteric, the thought behind it actually is—like most great advances in science—a simple succession of clearly expressible relationships

THE BEGINNING was young Bill s instrumentation Since the spectograph operates by splitting up color and studying the fragments, his attention was logically attracted by a Swiss device for making TV color pictures by projecting an identical image in the three primary colors in rapid succession

In this system known as eidophor, the pictures are reproduced on the TV screen by rippling a film of oil with a beam of electrons and shooting light through the iridescent ripple during the instant of its existence

Bill Glenn didn t do much more than register the principle because American television had tried and already abandoned the successive projection of primary colors in favor of simultaneous projection of all colors

He turned his mind from sight to sound and played with wavs of improving phonograph records which are traditionally formed in two steps —a master etching on steel and pressing of plastic copies from that master mold

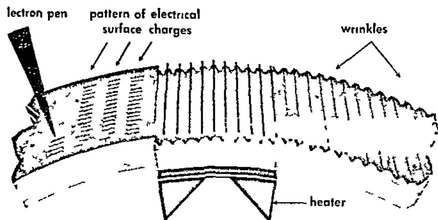
Wasn t there a simpler method of making those duplicates? Suddenly his thinking jumped out of the grooves where sound was stored back to the momentary ripple in the film of oil that gave off visua images

Why not etch sound recordin with an electron pencil? Come t that, why not use such a pencil t fill records with pictures? Or, bett still, how about putting the pictur on a film that could be reeled off f movies?

There was the invention, as sprang into Bill Glenn's head T only remaining question was Wh sort of film? High speed compute some of them manufactured by G were already doing their memoriz and calculating on plastic tape p cessed to receive and retain elect charges magnetically The charg merely rode along invisibly on t surface Could they possibly be p suaded to indent the tape like groove in a phonograph recor They could be and young Bill fina worked out a thermoplastic syst of recording visual pictures in t following manner

First the original photograph taken electronically as by a T camera The picture is then copie line by line either in black and wh or in full color by a pen that writ with electrons rather than with in The intensity of the lighted a shaded areas of the picture dete mines the force with which the p ejects the electrons in different par of the several lines

The point of the electron p hangs suspended within a vacuu above a revolving reel of plast ribbon The ribbon is made in thr layers the top layer magnetized receive the electronic impressio



om the pen a middle layer capable : conducting electricity and a ird layer to serve as a stable base or the upper two

At the moment the electrons fall nto the magnetically ready top iyer the surface of that layer is olid But immediately after that oint in the ribbon has moved past ne pen the layer is melted elec ically and the negative charges of he electrons sinl into the conduct ng layer in response to the attrac ion of positive electrical charges in he bottom of the ribbon

Wrinkles are thus formed in vary ng depths depending on the force vith which the electrons poured out if the pen The ribbon proceeds in his melted state only far enough to illow the wrinkles to reach their full lepth Then the melting stops and reezing sets in instead fixing the vrinkles like long narrow panes in i furrowed window

When rays of light are cast through these furrows the original picture is reproduced in detailed fidelity without the necessity of passing through any of the intricate, time consuming chemistry required to develop conventional photo graphs

IF COLOR IMAGES are desired the original picture is broken up by what amounts to an electronic prism The light is scattered by means of a grating in which each of the openings is just wide enough to accommodate one color at a time

The amount of ribbon surface used to record color impressions is four times as great as that needed for black and white pictures But since the black and white version of this new form of communication holds 100 times as much information as the next most efficient means the thermoplastic recording potential for color photography is good

Bill Glenn described his sci working of his invention — everything seems to require a name these days, it is called in the *Journal of Applied*

The philosopher should be a man willing to listen to every suggestion, but determined to judge for himself He should not be biased by appearances, have no favorite hypothesis, be of no school, and in doctrine have no master He should not be a respecter of persons, but of things Truth should be his primary object If to these qualities he added industry, he may indeed go and hope to walk within the veil of the temple of Nature —*Michael Faraday*

Other researchers who knew of his work interpreted it for newspaper men These interpretations centered mainly on the value of thermoplastic recording to Hollywood and tele vision movie making

It was pointed out that the pos sibility of viewing pictures through a magnifying lens while they were rolling onto the reel of recording ribbon would enable a movie direc tor to edit a film as the actors per formed it making choices from dif ferent camera angles and erasing un desirable shots

General Electric declined any comment on the new invention prior to a demonstration in New York City Movie and TV potentialities were then made to share attention with two other perhaps more signifi cant uses for TPR

The automatic factory and the automatic office are nearer because of Glenn s ingenuity TPR's images can be conveyed electronically with out diminution in the amount of data that is packed on microfilm One standard size typewriter ribbo spool would hold every word o every page of the 24 volumes of th current edition of the *Encyclopaed Britannica*

If there were a person who cou flip the pages fast enough the pi torial image of the text of each the 24 books could be recorded one minute of time And if the h man eye were able to read at su breakneck speed, the words cou be scanned while they flew from t printed pages into storage on t rolling reel

Even more important, for sor purposes is the possibility of sto ping the ribbon instantaneous projecting information recorded a particular point in quickly rea able form, making a decision bas on the data and then proceeding

• • •

It is to the earth satellites th the greatest benefit of TPR accru A satellite is only as valuable as t information it sends back to eart Because of size and weight limit tions telemetered results of satelli observations are notoriously limite Now the spectrum is immeasurabl broadened

A global police system has thu become practical through young Glenn s invention When it finall takes form no one will be happie than he By choice a lonely vator in the laboratory, he is a warm and friendly extrovert in every other way If posterity tags him for fame as a force for peace among men, it will be because of an accidental

nction of his science and a particu : moment in history

But on a smaller scale young Bill .s been more deliberate in his ef rts to protect the human species om foolishness The contribution s neighbors know best is the cata aran hull he poured from plastic am and covered with glass cloth is boat can t possibly sink when runs it before the wind

The boat even has a transparent sail so Bill can always see what he s heading into When the sun s rays slant at a certain angle the effect is one of voyagers in a dream apparently unpropelled yet unmistakably moving

There is an ephemeral quality in the air then reminiscent of Bill s pictures which melt and freeze and melt again

Tiny Animals Build Earth's Crust

RILLIONS OF TRILLIONS OF TRILLIONS invisibly small animals are major ilders of parts of the planet s crust In the past several hundred million ars they have made limestone floors much as 100 feet thick They have en contributors to the rocks of some ands—about 30 percent for example the West Ind an island of Barbados iere are countless numbers of them most everywhere in the present eans and almost 1/3 of the floors in e deep parts of the oceans are com osed largely of the remains of these imals Most of them however are o small to be seen without the aid of microscope

Probably the largest collection of iese creatures in the world is in the mithsonian Institution where these ny creatures are being classified and ud ed

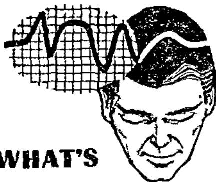
These animals are the Foraminifera iost of which are about the size of ne grains of sand They constitute a iajor an mal order Each is a single ell living in a single or several chambers of a hard decay resistant by a cement produced by the animal

These tiny creatures live in prolific numbers in the surface waters and on the bottoms of the present oceans They are also abundant in rock de posits formed under the sea millions of years ago Because of their great abundance and their limy shell which is preserved in mud after the death of the animal the Foraminifera are important aids in interpreting conditions in the geologic past

Of particular interest are those Foraminifera which live in the surface layers of the oceans the so called pelagic forms When they die they sink to the bottom of the sea floor where the shells are preserved in the mud In the deep ocean areas far removed from land the amount of shells is actually greater than the amount of mud on the sea floor and these form deposits known as globigerina ooze

This process has been going on according to recent findings since the Cretaceous geological period when the lands were inhabitated mainly by dinosaurs

Because lime is soluble in very waters Foraminifera are not fo the very deepest parts of the basins



WHAT'S ON YOUR MIND ?

CHILDREN MAY SUFFER FROM "SCHOOL PHOBIA"

Children who develop an intense aversion to going to school may be suffering from "school phobia

This is a psychiatric condition which apparently has been growing steadily in the last decade according to an article in *What's New*, Abbott Laboratories publication for the medical profession

"It cannot be stated with certainty whether the increase reflects greater incidence or a more widespread recognition of the psychiatric aspects of the disorder," the article states At the same time it can be assumed there are a large number of unreported cases "

Most frequently found in children between the ages of six and ten, school phobia is defined as a "partial or total inability to go to school that results from an irrational dread of some aspect of the *school situation* " The remedy is, "assurance and matter-of fact *recognition that* school attendance is mandatory "

This may be difficult because of the "neurotic involvement' of parents "The typically overprotective mother clutches at the child s complaints as adequate excuses for letting him stay at home The father *frequently a passive* individual w will join forces with the mother help project the blame for the chil behavior onto the school '

One aspect of school phobia is th the child even though he remains home during the *school hours* very much concerned lest any know he is not at school ' M observers believe the condition usually related to "an intense of leaving the security of home a mother "



If the situation is allowed worsen, the article suggests tha therapeutic program may have to worked out *involving teacher a* parent cooperation and psychiat aid

"TRUTH DRUGS" CAN PRODUCE UNTRUTHFUL *STATEMENTS*

A Yale psychiatrist warns that *called "truth drugs"* quite often duce untruthful statements from t patient and are therefore not re able for criminal interrogation

Doctor Lawrence Z Freedman the Yale School of *Medicine emph* sizes that these drugs such as so

amytal and sodium pentothal, extremely useful in psychiatric itment, but that the "truth" fac has been misinterpreted by the ılic

Narcoanalysis, the technique of oloying drugs to stimulate the ient's talk will usually stimulate noncommunicative patient to uninhibitedly and thus speed itment But is the talk always truth?

No, answers Dr Freedman in a ort published in *Scientific Amer* "I have employed sodium ytal in investigating the person ies of men accused of various lian and military antisocial acts states The subjects ranged diag tically from those with character orders and neuroses to psychotics offenses charged to them in ded mild delinquency as well as rder

Out of all the information I ob ied from them during hours of errogation under the influence of drug there was little that could interpreted directly in the light its manifest content I could , on the basis of a patient s state nts testify in a court that I knew t a given act had occurred Guilt den subjects under sedation were me to confess to offenses they had

jective sign indicated they had nmitted"

Doctor Freedman stresses that rious wrong can be done both to the embryonic science of criminol ogy and to the administration of justice if this procedure is employed as a fact finding instrument"

EXECUTIVES WANT SYMBOLS OF STATUS

Corporations which give Cadillacs, keys to the washroom and other status symbols to their executives are following sound business strategy according to George S Odiorne, director of the University of Mich igan Bureau of Industrial Relations

While businessmen may enjoy status based on power over others the U S has at least two other social hierarchies he explains One is based on intellect the other on taste

America can t be described sim ply as a rigid series of sociological stratas says Odiorne 'Janitors and charladies may play in commu nity symphony orchestras Machine operators and secretaries may have finer tastes more discrimination in the arts and read more cultural books than the president of their cor poration



'Highbrows in our society from the standpoint of taste, aren t the highest paid Middlebrows may live in mansions or cold water flats S of the purest specimens of l taste and ordinary intellect seminars open only to executiv

America is still a democratic, equable and brawling country Per manent elites which combine state, intellect and taste as did the landed aristocracy of old Europe are get ting farther and farther away'

Odiorne suggests that corporations can use status as an incentive for po tential executives He also pointed out that a person pays a price for moving into the higher status man agement groups

A top manager must sacrifice his leisure time and give up most of his cultural and esthetic pursuits He must not expect a normal family life and will be forced to give up the sta bility that comes with living in one place Odiorne concludes

BRITISH DOCTOR WARNS WIVES MAY BE KILLING THEIR HUSBANDS

The number of women who de liberately set out to kill their hus bands is surprisingly small says Dr Kenneth C Hutchin of England



On the other hand a great many wives could not polish them off bet ter if they tried he added

He cautioned that the wife who always insists on having the last word often has it

Doctor Hutchin s remarks were quoted in *The New York Times*

When your husband comes home from work tired out after a hard day, be bright and cheerful don t start telling him your trou before he is properly in de house' Dr Hutchin sugge ted the wife let him have a cup of 'before you start in on him

Anger and frustration are dan ous emotions for tired middle-a men with a poor coronary circ tion Dr Hutchin said and he vised that wives humor their bands a little

It s risky for a woman to cros husband continually Dr Hut warned He may be wrong he p ably is but why do you have to him?

The trouble is that men lil think they know best Dr Hu said Why not let them thin! It is not a very high price to pa peace and security and good he

If you can make your hor haven from the busy world family will be grateful to you all that is what a home is'

TABOOS STILL EXERT STRONG INFLUENCE

The supernatural still exer strong influence in some part the world

Strange taboos delay the acc ance of new medical knowledge agricultural methods

South Sea Islanders first used word taboo to denote certain bidden things words or acts National Geographic Society s In common usage the term s m ing has since been extended to clude almost anything frowned even the mere indelicacy in p

cles of eating peas with one s
gers

In the strict sense, however, a
boo must carry an occult danger
eaking a taboo means the culprit
ll inevitably be stricken by super
tural retribution

Taboos persist in civilization
any people consider it bad luck to
alk under a ladder open an um
ella inside the house or put a hat
the bed The idea is that some
ing uncanny will happen to any

id the power to impose taboos—
id sometimes did

In the valley of Puamau re
orted anthropologist Ralph Linton
I once visited the local chief who
ad a boy of eight or nine When I
rived the chief and his family
ere camping in the front yard and
e boy was sitting in the house
oking both glum and triumphant
le had had a quarrel with his father
day or two before and had taboo
d the house Until he lifted the
aboo no one in the family could
nter the house

SYCHOANALYSIS NOT DEDUCTIBLE OR PSYCHIATRIST

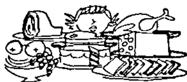
A psychiatrist who tries to im
rove himself psychiatrically by
aving himself psychoanalyzed can t
leduct the cost of the analysis from
his taxes as a business expense says
the United States tax court

The court decided that a psychia
trist is actually training himself in
a new field while undergoing psy
choanalysis rather than improving
himself in psychiatry.

According to the court a psychia
trist is a medical doctor who has
been trained in psychiatry in order
to help patients with their mental
problems A psychoanalyst is a psy
chiatrist who having been psycho
analyzed himself is qualified to ad
minister to his patients a long term
therapy called psychoanalysis

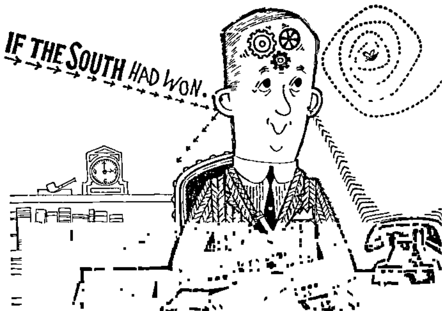
MENTAL ATTITUDE AFFECTS TENDENCY TO OVEREAT

Emotional depression disturbs the
normal balance of sugar metabolism
in the body and this in turn causes
some people to overeat investigators
have found



The overeating is not caused by
an increase in the hunger drive, but
by a failure of the brain s signal
mechanism to indicate when hunger
has been satisfied Dr Albert Stunk
ard professor of psychiatry at the
University of Pennsylvania re
ported The upset sugar metabolism
seems to interfere with proper stimu
lation of the brain s mechanism for
indicating hunger satisfaction

Research by Dr Stunkard and his
team of investigators indicates that
mental attitude and reactions play
an important role in accele
retarding a person s incl
become overweight



LEARN how to LISTEN

by Eileen L Daly

Condensed from This Week Magazine

THE ATMOSPHERE in the conference room was tense Five young engineers were sitting with the head of a large industrial planning organization, trying to settle details of an important new plant site for a major client

Suddenly one of the young engineers proposed what he considered a sensible solution to the problem What he had to say was greeted by an uncomfortable silence The head of the concern then laughingly pointed out that the same proposal had been made and rejected some minutes earlier.

This Week (Feb 21 60) ©1960 United Newspapers Magazine Corp 485 Lexington Ave New York 17 N Y

The incident seemed amusin the time, but several months lat didn't After the project had successfully completed, most of engineers who had worked o were promoted, but the young e neer who had made a fool of hin at the conference was passed c

What had happened? The yc engineer swore that he had heard the proposal made and rej ed—and he was right He wa victim of a bad listening habit he didn't even realize he had

But listening habits can handi you mightily in your daily liv Much of your success, both in work and socially, is related to l

ou listen A number of major indus es and more than 20 leading col ges have become so concerned out our faulty listening habits at they have set up listening nics and courses to find out what wrong—and what to do about it

My own experience as a teacher one of these clinics has convinced e that many people who seem to be tening miss important points and draw incorrect conclusions from hat is said And that is a serious ndicap when you consider that ır attitudes toward so many things -what to think of other people how make good on the job—are shaped ore by the persuasive spoken word ian by any other means of com unication

What are the faulty hearing habits at threaten us in so many ways? ere are some of the more common nes I ve observed in a close study my many clinic students

Our minds won t wait Our houghts can race along from four to ten times faster than most people peak So while we are waiting for he words to come in our thoughts end to go off on a tangent and ometimes remain away too long

Your boss perhaps is discussing situation with you You want to iear it all But what happens? Your nind tunes out comes back tunes out again Why doesn t some one kill that fly? I wonder who ust came into the other room? Suddenly a few words penetrate Since you agree with my sugges tion' your boss says What did he suggest? Such tuning out lapses are common—and sometimes costly

We think we know already

We re so sure we know what the speaker is going to say that we listen with just half an ear

A newspaper publisher once told me how this listening habit had cost him a sizable sum

When a regular client tele phoned an order for a new series of ads the person taking the order simply wrote out a standard order form Not until too late did the publisher learn that the client had wanted the new ads to be four times as large as the old But since the smaller ads had already been set in type by then the client decided to run them

One clerk s job around that news paper office was pretty shaky for a time

We re looking not listening How often in introductions has a name failed to penetrate because your mind was occupied with its owner s appearance or mannerisms? For the same reason and far more often than you may suspect other infor mation fails to register

We are busy listeners We try to listen while giving part of our atten tion to a newspaper or a radio or television program Outside noise also clamor for a share of our atten tion No wonder we don t really hear

We miss the big idea Once I ga my students a list of vocabul words which would appear in a cording of a newscast The stu were to listen for these wor

consider how they were used in context

But when I questioned them about the general content, they replied, "Oh, we weren't listening for that; we were just listening for the words"

The poor listener "just hears words" Have you ever had the feeling that a speaker said a lot but that you didn't quite "get" it all? This may have been the speaker s fault, or perhaps you haven t learned to look for the main ideas and the important supporting details

Our emotions make us deaf Do you recall a speech or conversation that got you riled up? How well did you listen once your blood started to boil?

When someone offers opposing ideas on a matter about which we have a strong opinion—religion say, or politics—we unconsciously feel that it is risky to listen we might hear something that could make us question our own views We mentally stop receiving him while we plan our verbal counterattack

These are some of the common listening faults Fortunately with so little effort you can correct any that may be handicapping you I recommend these six ways to make yourself a better listener

1 Learn to concentrate It's an important factor in listening Practice such games as "Take 2 plus 3, minus 5, plus 4, times 2 minus 6—what's the answer?" Similar exercises are used in listening training courses

2 Run a television test With a friend or relative listen to a radio or television talk See how many the ideas presented you can re

If you find yourself "Well, he sort of talked about and then he said and then you may have missed the point With the other listener, t agree on a pretty specific of the main ideas



3 Cut out distractions Re to put aside the newspaper and half listening to a radio or telev program when someone is tryi talk to you

4 Accept controversy W someone brings up a controve subject don t automatically deaf Check your all too na tendency to stop listening thinking up devastating remarl deliver in the next silence

Instead plan a question base his remarks Not the kind that cut the opposition down to size, one that will make sure you are ting what is being said

5 Repeat instructions Prac repeating instructions and direct correctly Unless you can do so obviously will not be able to them out properly

6 Help others listen I *we encourage* bad listening habit our children by repeating our mands several times before gett obedience Insofar as possible *should* give them a command or and after that impose some pena so they will listen the first time

ınd we mıght set them a good mple by lıstenıng to them the tıme

·od lıstenıng ısn t easy Effec lıstenıng—hearıng, understand and rememberıng—takes a great l of energy It ıs dıfficult to en properly and do anythıng else same tıme But ıt pays recognızıng and correctıng any ng faults that may be handı you you may dıscover that s possıble to lısten your way to ser frıendshıps better relatıons your famıly larger pay checks d general success ın lıfe

Quiz

p! Don t read thıs—have some read the followıng quız to you ore you look at ıt yourself Use ıcıl and paper and answer as best can Here goes

1. In the lıst of names—George, Davıd Adam Kenneth — ıch begıns wıth J ?

2. Suppose you were gıven these dırectıons 'Go to Room 325 and look ın the lower rıght hand drawer and brıng me all the boxes of wrıtıng paper that are left ın there' Were you told to look ın the left or the rıght hand drawer? Were you told to go to Room 235 325 or 225?

3. Answer true or false to the followıng In the lıst of words bee—see — free — glee — me the second word mentıoned ıs the word free

4. Mary asked her husband to brıng home meat mılk cheese and bread He brought mılk peas bread and meat Whıch ıtem dıd he omıt?

Here are the correct answers 1—John 2—rıght and 325 3—false 4—cheese

How dıd you come out? If not too well you have a great deal of com pany however by followıng the sıx recommended steps you can ım prove your lıstenıng habıts

Foam Points to Contaminated Well Water

SOAPY FOAM ın your drınkıng water mean the well that supplıes the should be abandoned as unsafe Detergents unlıke soaps are only removed by a septıc tank Je Deluty of the Rhode Island De of Health explaıns ın *Publıc Reports* They are very stable and wıll travel long dıstances ı the ground and ınto the water able

As more housıng developments go up here publıc water supplıes or publıc sewers are not avaılable contamınatıon of drınkıng water wıth detergents can be expected to ıncrease Deluty says

If detergent concentratıon ıs hıgh enough that ıs suffıcıent evıdence that seepage from the sewage dısposal field ıs gettıng ınto the well

Deluty s department recommends lot sızes of at least two acres where there are no publ c water facıl tıes and a dıstance of at least 100 tween any well and any se posal unıt

Satellites Now In Orbit

The United States recently launched two important space vehicles T second of the two was the 270 pound weather eye satellite, Tiros I wh was launched April 1 Tiros I is the first artificial satellite to pro detailed photographs of the earth's cloud cover Tiros I is considere prototype of satellites that are expected, in a few years, to give worldw weather data to forecasters

Before Tiros the U S shot a 94 8 pound sphere, Pioneer V, into unending orbit around the sun It marked the first time a ' live" messe had been sent so deep into the solar system Two other cosmic vehicle Soviet s 3 245 pound cosmic rocket (Mechta) and the U S 's 13 4 Pioneer IV fell into orbit around the sun after their radios had gone d At that time they were about 400 000 miles distant and from then on no longer of value to science

Pioneer V which was launched last March 11 was expected to con sending back valuable information until about mid summer At that it will be more than 50 million miles away from the earth, and its 150 radio transmitter will be out of range If the planetoid s instruments out radio contact may be re established in 1963 when Pioneer V a comes within 50 million miles of the earth

Following is a list of satellites launched from the earth and still in s as of April 10, 1960

Name	Country	Weight	Date L'nchd	Est. Lifetim
Explorer I	U S	30 8 lbs	1/31/58	3-5 years
Vanguard I	U S	3 25 lbs	3/17/58	200 1,000 y
Lunik I* (Mechta)	U S S R	3,245 lbs	1/ 2/59	long life
Vanguard II	U S	20 7 lbs	2/17/59	10 years
Pioneer IV*	U S	13 40 lbs	3/ 3/59	long life
Explorer VI (Paddle-Wheel)	U S	142 lbs	8/ 7/59	to Aug 196
Discoverer V (rocket parts only)	U S	less than 300 lbs	8/13/59	burned up 9/28/59
Vanguard III	U S	about 100 lbs	9/18/59	30 40 years
Lunik III	U S S R	about 614 lbs	10/ 4/59	long life
Explorer VII	U S	91.5 lbs	10/13/59	20 years
Discoverer VIII	U S	(not available)	11/20/59	2 3 month
Pioneer V*	U S	94 8 lbs	3/11/60	long life
Tiros I	U S	270 lbs	4/ 1/60	(not availab

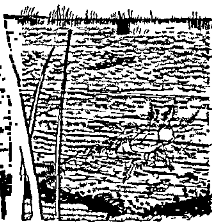
* in orbit around sun

One moment they are crawling things, the next they take to the air on wings

Strange Drama of the May Fly

by Roy L. Abbott





)F ALL the world's creatures, May flies come nearest being tylike and unreal Four-winged d with long streaming tails—frag- and light as air—they come into ult life at the beginning of sum- :r, dance themselves to death in : twilight of a single day and die, ually without seeing a sunrise

Strange creatures, these May :s! Seemingly born of the mud d slime of lake or river bottom, .e moment they are sluggish crawl- g things, the next they take to the : on broad shining wings

Up there in the shadows above the ıter, instinct leads them each to its mate, for this is their mating day and this their mating flight.

For a few hours they frolic and dance merrily together, then they part, the males to struggle on until death comes, the females to drop eggs into the water, only soon to flutter after them and drown.

To those who live in the higher and drier parts of our country, May flies are almost unknown, but to those who live near the Great Lakes or along the Mississippi, they are an early summer pest The flies swarm about street lights; they get in one's face like a cloud of big gnats, and their countless bodies make tł

sidewalks slippery underfoot Just recently, in a city along the Missis sippi, I saw a man early one morn ing shoveling them from the side-walk in front of his store

Uncounted millions fall into the water and swept along by current and wave pile in windrows along the shores other millions become food for fishes who enjoy a field day when the May flies are in the air The so called duns and drakes of the British anglers are merely arti ficial lures made in imitation of the delectably May fly

Men who study May flies call them *Ephemeridae* which is Greek for saying that they are short lived —children of a day Many in fact do not live a full span of 24 hours mouthless and without any reserve food supply their frail bodies are seemingly too weak to endure their new found environment

To see the drama of the May fly you must thoughtfully plan ahead for the opportunity comes but once a year People who dwell by lake and streamside have doubtless been present at the birth of these tiny creatures as I have been many times

To observe this strange happening one must watch closely For on the particular day they have chosen for birth no weather sign gives notice that they are about to be born But bend close to the water and you may see many tiny creatures full grown May fly larvae or nymphs creeping forth from the mud at the bottom

They are doing something they have never done before leaving their haunts amid the slime and oo- places to which they have closely a- hered for one or two years—and coming to the surface

They are ugly creatures—t- immature May flies—with st legs long three-parted tails and bodies fringed with flat gills thro- which they obtain—somewhat lik fish—oxygen from the water O a May fly reaches the surface of water a mo t amazing thing h pens The body covering rends w on the back of each fly and th after a moment s frantic wrigglin May fly is born!

For now there issues from cleft in the strange creatu armor not the same being you the moment before but a May a winged birdlike air breath mouthless thing as unlike the mal from which it sprang as a l is unlike a lizard

Although winged this marvel newborn insect is still not ready its short life in the air It must yet another unusual thing it m shed its outer covering once mor an act that no other adult ins ever performs Fluttering to nearest branch the fairy May quickly divests itself of its ou coat even to the last gauzy cover of the wings and now in full ma rity and attire takes to the air

Yet this glorious "coming (party of the May flies—this alm unbelievable drama of birth a death in a day—has not been wi out elaborate preparation A ye or more before countless other M

s set forth on this same strange ht, and near the end of that dance death each female had dropped 500 or 600 eggs into a lake or eam

Each egg had quickly hatched into iny, flattened creature wingless first and soft of body, but with six rdy legs, well formed jaws and appetite for plant food which it it constantly nibbling at the etation at the bottom

Here, in secret places among the id weeds and mud it ate greedily l grew rapidly so rapidly in fact shed its body covering every nth or so—its wing sprouts get g longer with each molt—for like insects its outer coat would not etch and had to be discarded if its ssessor were to grow

Men call this little immature May y a naiad perhaps fancying that e those nymphs of myth it too esides over the water in which it es But the tiny naiads—never iger than your thumb s length— e not only innocent of any knowl ge of their name but of the qual es of their fabled predecessors as ll

Because of the air tubes running tward into the plate like gills ich fringe their slender bodies the ads do not have to go to the sur ce to breathe as do mosquito wrig ers, water bugs, and beetles which e near them Being almost en ely vegetarian in habit they do t need to prowl so ceaselessly for od as do these creatures whose enu calls for meat and because of is activity do not expose them selves to those who would kill them

DESPITE these advantages, the life of the naiad is a precarious one Millions of naiads become adult May flies it is true, but only because they are the fortunate ones among the many other millions who started life at the same time as they but fell victims to the countless predators who hunt the naiad as men hunt game

Nature apparently thought of the May fly at its creation as men did of the machine gun If the machine gun is fired often enough it is bound to hit someone reasoned the human inventor If nature produces enough naiads some are bound to grow into mature May flies So in spite of the enormous yearly casualty list, some do grow up

What are the enemies of the naiads? Many fish eat them Some in fact depend upon them almost entirely as a source of food Perhaps their most sinister enemy, is the dragonfly nymph, the adult of which is that fierce insect hawk, called 'snake doctor' or 'devil s darning needle" because of its supposed ministrations to snakes, or its pen chant for "sewing up the ears' of bad children

But the dragonfly is really harm ful only to insects and its [illegible] that mud colored square f harmless looking jet propelle[illegible] mon—is the real enemy of the

Jet propelled? Yes the [illegible] dragonfly moves by the [illegible] of drawing water into its [illegible] tine and shooting itself

short spurts by forcibly ejecting the water at the rear But much of the time it lies quiet, its flat face appear ing as harmless as a clod

When the unsuspecting naiad comes within range however the dragonfly nymph suddenly unleashes its weapon Half or more of that flat face is shot forward like a jack in the box and when it — the masked jaw—is withdrawn again into that clodlike face of the nymph the poor naiad is behind it—one of the many who never grow up to perform the airy ' dance of death

Anyone watching the long history of the May fly s infancy the whole to be climaxed by only a day of adult life can readily see in this creature a reversal of the usual order of life s cycle With most animals — the larger ones at least—the period of infancy is usually crowned with a much longer period of adulthood Infancy is only a preparatory grow ing up time for adulthood the really purposeful part No one knows however why the May fly has gone about its business of living in topsy turvy fashion

THE OBSERVER too, is likely t conclude that the May fly is o creature at least, which rea proves that there is something n under the sun Here surely is animal which serves no useful p pose But such is far from the tru For the very observer who reac that conclusion is one of those cr tures most benefited by this app ently useless life It need only recalled that fish eat May flies : that men eat fish

The scientist Blaise Pascal (amused himself by speculating u what might have been the e upon the course of human his had Cleopatra s nose been say inch shorter than it was That q tion of course is unanswerable day but it is not difficult to bel that the fishlife of our inland wa and those dependent upon the fi would be greatly changed were May flies exterminated

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Weaverbird Attracts Mate With Nestbuilding Skill

A COLONY of African weaverbirds now living on the University of California campus is keeping scientists informed on the species interest ng nesting and social customs

The male village weaverbird weaves an elaborate nest then attempts to lure the female by cl nging to the under side of the nest and giving a noisy dis play The female then inspects the nest and if she l kes it the two become mates according to Dr Nicholas Collias U C.L.A zoologist who spe year studying weaverbirds in Af and now maintains a colony of

Some amb itious males in Dr Coll colony have gone in for multiple build ng and during the past bree season 11 of them bu lt a total of nests Those able to sell more one nest naturally became p

—*Scope Weekly*



Find 2,600 Year-Old Seals Frozen in Antarctic

IE U S COAST GUARD icebreaker *East* *nd* brought back from Antarctica the rfectly preserved carcasses of two 600 year old seals

The seals were delivered to the Lub ck Technical Museum in Texas for idy and research They were among group of 90 dead seals which an rial survey photograph had shown tombed in the ice of Taylor Ravine the Antarctic Capt Richard D Schmidtman captain of the *East Wind* said

Special scientific processes have shown the seals to be about 2 600 years old Capt Schmidtman said scientists had concluded that the seals had either wandered into the ravine or had been chased there by some unknown animal The ravine was miles from their natural food and they had starved to death before they could get out

Growth Linked to ack of Germs



DEARTH OF germs may be helping mericans grow larger from genera on to generation while stature remains nstant in seriously underdeveloped tions research at the Rockefeller In itute suggests

A recent study shows that mice ared in semi germ free conditions ow abnormally well on adequate diets nd even continue to grow on diets that rdinarily would be called deficient re orts *The New York Times*

The ultra clean mice however roved abnormally susceptible to ill ess when they were subjected to di ease-causing germs

The findings on growth were most unexpected according to Dr Rene J Dubos a microbiologist at the institute He said they indicated that the germs that lived normally in the digestive tract were of surprisingly great impor tance to overall health and nutrition

• • •

He also said that foreign scientists visiting the experimental mouse colony at the institute had suggested parallels between American children and germ scarce mice on the one hand normal mice and children in primitive conditions in under oped areas on the other

COUGH S VELOCITY LIKE A HURRICANE

To remove life endangering foreign bodies from the lungs, nature has given man a powerful, built in air compressor

The compression chamber is the rigid walled chest Its contracting muscles squeeze the air trapped in the lungs so that the pressure mounts to a seam bursting point

Then the muscles around the voice box relax opening the glottis There is a sudden release of pressure in the lungs At the same time a piston in the form of the muscular diaphragm comes driving upward against the lungs

The air rushes out of the respiratory tract with a velocity that sometimes reaches the speed of a hurricane, says Dr Andrew Banyai Chicago physician and world expert in chest diseases



The whirlwind sweeps up and carries with it mucus and other objectionable matter from the air passages

Thus the cough is often a healthy cleansing device Dr Banyai points out in *GP*, publication of the Ameri

for a cough medicine he told physicians



th

of

On the other hand, it is import to make certain the cough is serv a purpose for a useless cough is without a certain amount of dan

Violent coughing spells have b known to fracture one or more r Dr Banyai explained

They also have caused fain spells lasting from a few second two or three minutes impose strain on the heart set off headac led to undue fatigue and stress even torn a hole in the diaphra the muscular lining separating organs of the chest from the abd nal cavity

ANEMIA-CAUSING AGENT IMMUNIZES RATS TO CANCER

The first successful cancer munization of animals with a bl substance is reported by the Am ican Cancer Society Heretof animals have been immunized w whole tumor cells and with extra from tumor

The blood substance may be pure chemical It is known as FH or Filterable Hemolytic Agent I Jerome H Sacks and Dr Richard Egdahl of the Medical College Virginia who have been wor

ress

.DICINE



ith it have found it has prevented high percentage of the six types of xperimental rat tumors tested so ar

Whether this finding will have any pplication to the prevention of uman cancer is highly speculative he American Cancer Society em hasizes that vaccination success chieved so far has been only against tandard transplantable tumors in ats It is not known whether it vould prevent the appearance of umors which develop spontaneously n rats or whether it would immunize gainst transplantable tumors of nice or other species

The FHA agent is a tiny molecule ess than 1/50th of a micron in di ameter indicating that it is either a emarkably small virus or a fraction of a virus It is large enough how ever to induce a strong antibody reaction when used as a vaccine An average of about 55 percent of rats vaccinated with it before a tumor was transplanted into them were completely and possibly permanent ly immune to it

FHA causes acute hemolytic ane mia a disease in which red blood cells are destroyed This makes ex perimentation with it in humans a potentially dangerous thing Many more animal tests must be conducted before human tests may be consid ered

OIL FATS BENEFICIAL IF SUBSTITUTED FOR HARD FATS

The dieter using liquid fats to lower abnormally high cholesterol is cautioned in an editorial in the *Journal of the American Medical Association* that they are substitutes not supplements for hard fats

Doctor Herbert Pollack of New York University author of the edi torial said many lay persons ap parently have been led to believe that oil fats are in effect a medicine, and that simply adding them to the diet on top of normal food intake will lower the cholesterol

That diet will lead only to obesity, says Dr Pollack



However if substitution of oil fat is made under proper direction the blood cholesterol level can be low ered to a greater degree than if the individual reduced his fat consump tion generally

The blood cholesterol role is one of the most sharply debated issues in medicine

Th ... mber of

greases the skids for a heart attack Among hard fats are cream cheese, butter, ice cream fatty types of meat, bacon and lard

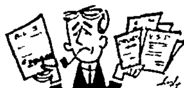
The oil fats such as corn oil cottonseed oil and soya oil contain an appreciable amount of unsaturated fatty acids that will lower the blood cholesterol level according to Pollack

By contrast the solid fats contain more 'saturated fatty acids that raise the cholesterol level A vegetable oil that has been hardened into a margarine or shortening for example loses many of its unsaturated qualities

AVERAGE FAMILY SPENDS $294 FOR HEALTH SERVICES

The average American family is spending 42 percent more for personal health service than it did five years ago according to the Health Information Foundation

The two groups at either end of the age scale—children under six and persons over 65—increased their



use of medical services by about 45 percent during the five-year period

The largest single component of spending for health in the year of the study (1957 58) was for services of physicians It accounted for 4 cents of the health dollar Then came hospitals, 23 percent drugs and medications, 20 percent dental services, 15 percent, and other medical goods and services (eyeglasses special duty nursing etc)

Expenditures varied greatly among families About one third of all families spent less than $100 another third $100-$299, and the remaining third $300 or more The average family spends about $294 a year

"HEAD-TILT' RESUSCITATION TECHNIQUE IS FOUND BEST

The mouth to mouth resuscitation method can be improved if the head of the victim is tilted back as far as possible according to findings of seven research centers studying emergency artificial respiration

Inflation of the lungs through the nose is preferred since it prevents air from getting into the victim's stomach the report in the *Journal of the American Medical Association* said It also is best suited for the victim whose jaws are too tightly clenched to be opened

The research centers said they found oral airways for resuscitation such as tubes and masks which have been placed on the market should not be used by untrained laymen They said such devices have been promoted and sold without official medical approval

The steps in the new 'head tilt' method are these

1 Lift the neck of the victim

2 Tilt the head as far back as possible by holding the crown of the head with one hand Sufficient tilting usually opens the victim s mouth

3 Pull the victim s chin upward
4 Inflate the lungs through the ose or mouth or if an infant irough the nose and mouth
5 Remove your mouth to let the ictim exhale passively

Small victims particularly after ibmersion in water or obstruction y a foreign body in the upper air ay should be inverted and if nec ssary sharp blows applied between ie shoulder blades to help dislodge ie offending material

ETER IMPLANTED IN NIMAL TRANSMITS DATA

A temperature telemeter im lanted permanently into a labora ory animal to transmit information as been developed by a b oelec onics eng neer at the Franklin In itute Philadelphia

John H Busser who developed ie device for the Office of Naval esearch said the telemeter needs o batteries It works when the an nal in which it is implanted is sur ounded by a low frequency power eld—equivalent to placing the an nal inside a transformer From this ower field the device gets energy to end back its f ndings to a receiver

The telemeter so far is capable of ransmitting information only on emperature but it will be modified o transmit such information as lood pressure and heart beat

It promi es to give medical re earch men more accurate informa ion on fever man s natural defense gainst germs and viruses It elimi ates the need for handling animals n order to obtain readings

EARLIER PRESIDENTS LIVED MUCH LONGER

The average age at death of the first ten presidents of the United States—Washington to Tyler—was 77 4 years Among them were John Adams who died at 90 and three octogenarians They were Thomas Jefferson who died at age 83 (on July 4) Madison 85 and John Quincy Adams 80 Only Washing ton at 67 and William Henry Harri son at 68 died before they were 70

By contrast the last ten presi dents who have died from natural causes had an average age of 64 3 President Taft was the oldest in this group living to 77 The only others to reach the 70s were Hayes and Cleveland at 70 and 71 respec tively



Doctor Louis H Roddis a retired captain in the U S Medical Corps has studied the life span of presi dents He said that while the num ber in each group is too small to draw any firm conclusions the dif ference of 13 years between the aver age age of the first and the last ten presidents is rather startling and en coura es speculation

The question arises he whether the increased ties of the office are such a that they shorten life or earl er presidents

tougher breed of man Perhaps it was pure chance that gave us indi viduals in the first ten presidents who had a naturally longer life span than those in the last group

Doctor Roddis notes in *Current Medical Digest* that the longevity of the first ten presidents is all the more striking because of medical progress during the last 100 years Life ex pectancy has increased about 20 years in the last half century in this country

Three presidents were assassi nated They were Lincoln 56 Gar field, 49, and McKinley 58 Indeed says Dr Roddis the office of presi dent may be considered an occupa tional hazard

"SIT OUT" ASTHMATIC ATTACK, PHYSICIAN ADVISES

A University of Chicago physician is telling his asthma patients to throw away their pills sprays in halators and other self administered drugs and devices

He encourages them to "sit out" their attacks to take it easy and resist panic The result No more emergency type attacks

Doctor George V LeRoy profes sor of medicine, got the idea from reading some old text books the kind that in this day of wonder drugs and miracle treatments are scorned as horse and buggy medi cine He asked the question How did patients fare before the wonder drugs were discovered? The old liter ature showed that with few excep tions the ordinary asthmatic attack abates spontaneously

But this fact has been forgo apparently, and through the there has been built up a do self treatment tendency on of patients, especially when rine antihistamines, aminop and steroid hormones came along



Patients with simple kinds asthma have come to believe th won t survive an attack unless th quickly administer their drugs

Reviewing his own experie with such patients, Dr LeRoy fo they had certain common featu All were impatient individuals v wanted relief in a hurry whene their breathing was embarrassed had long histories of frantic trips the emergency room and urgent c for help usually at night

While he pondered the possibil of managing these special patie without the help of their handly tle nebulizers, Dr LeRoy fortif himself with the experience and op ions of medical predecessors

Now he has no hesistancy in questing all but a very few patie to give up their medicines The co trol of medication is transferr from the patient to the physician

While these patients may still an occasional asthma bout, they not go into the hysterical shortne of breath exhaustion and collap that used to mark their fears

From a world that has become too nall, we are moving out into one lat will be forever too large"

WE'LL NEVER CONQUER SPACE

by Arthur C Clarke

MAN will never conquer space Such a statement may sound d crous now that our rockets are readv 100 million miles beyond the oon and the first human travelers e preparing to leave the atmos iere Yet it expresses a truth which ır forefathers knew one we have rgotten — and our descendants ust learn again in heartbreak and neliness

Our age is in many ways unique ll of events and phenomena which ver occurred before and can never ippen again They distort our inking making us believe that hat is true now will be true forever iough perhaps on a larger scale ecause we have annihilated dis nce on this planet we imagine that e can do it once again The facts e far otherwise and we will see iem more clearly if we forget the esent and turn our minds towards ie past

To our ancestors the vastness of ie earth was a dominant fact con olling their thoughts and lives In ll earlier ages than ours the world is wide indeed and no man could er see more than a tiny fraction of s immensity A few hundred miles



—a thousand at the most—was in finity Only a lifetime ago parents waved farewell to their emigrating children in the virtual certainty that they would never meet again

And now within one incredible generation all this has changed Over the seas where Odysseus wan dered for a decade the Rome-Beirut Comet whispers its way within t hour And above that the cl satellites span the distance bet Troy and Ithaca in less th minute

Psychologically as well as physi cally, there are no longer any remote places on earth When a friend leaves for what was once a far coun try, even if he has no intention of returning, we cannot feel that same sense of irrevocable separation that saddened our forefathers We know that he is only hours away by jet liner and that we have merely to reach for the telephone to hear his voice

In a very few years when the satellite communication network is established we will be able to see friends on the far side of the earth as easily as we talk to them on the other side of the town Then the world will shrink no more for it will have become a dimensionless point

Forever Too Large

But the new stage that is opening up for the human drama will never shrink as the old one has done We have abolished space here on the little earth, we can never abolish the space that yawns between the stars Once again we are face to face with immensity and must accept its gran deur and terror its inspiring possi bilities and its dreadful restraints From a world that has become too small, we are moving out into one that will be forever too large whose frontiers will recede from us always

Arthur C Clarke a fellow of the Royal Astronomical Society of England is a prolific writer in the field of space his most recent book being *The Challenge of the Spaceship*

more swiftly than we can reach towards them

Consider first the fairly solar, or planetary, distances we are now preparing to assault very first Lunik made a substan impression upon them, travel more than 200 million miles fr the earth—six times the distance Mars When we have harnessed n clear energy for spaceflight, the so system will contract until it is l larger than the earth today The r motest of the planets will be perha no more than a week's travel fr the earth while Mars and Venus w be only a few hours away

This achievement which will witnessed within a century, m appear to make even the solar s tem a comfortable homely pl with such giant planets as Sat and Jupiter playing much the sa role in our thoughts as do Africa Asia today (Their qualitative ferences of climate atmosphere a gravity, fundamental though th are do not concern us at the m ment) To some extent this may true yet as soon as we pass beyo the orbit of the moon a mere qu ter million miles away we will m the first of the barriers that w separate the earth from her scatter children

The marvelous telephone and te vision network that will soon enme the whole world making all m neighbors cannot be extended in space It will never be possible converse with anyone on anoth planet

Do not misunderstand this stat

nent Even with today s radio equipment, the problem of sending speech to the other planets is al most trivial But the messages will take minutes—sometimes hours—on their journey because radio and light waves travel at the same lim ited speed of 186 000 miles a second

Twenty years from now you will

verbal messages is possible—but not a conversation

Even in the case of the nearby moon the 2 1/2 second time lag will be annoying At distances of more than a million miles it will be in tolerable

Time Barrier

To a culture which has come to take instantaneous communication for granted as part of the very struc ture of civilized life this time bar rier may have a profound psycho logical impact It will be a perpetual reminder of universal laws and limi tations against which not all our technology can ever prevail For it seems as certain as anything can be that no signal—still less any mate rial object—can ever travel faster than light

The velocity of light is the ulti mate speed limit being part of the very structure of space and time Within the narrow confines of the solar system it will not handicap us too severely once we have accepted the delays in communication which it involves At the worst these will amount to 20 hours—the time it takes a radio signal to span the orbit of Pluto the outermost planet

Between the three inner worlds the earth Mars and Venus it will never be more than 20 minutes—not enough to interfere seriously with commerce or administration, but more than sufficient to shatter those personal links of sound or vision that can give us a sense of direct contact with friends on earth wherever they may be

It is when we move out beyond the confines of the solar system that we come face to face with an alto gether new order of cosmic reality Even today many otherwise edu cated men—like those savages who can count to three but lump together all numbers beyond four—cannot grasp the profound distinction be tween solar and stellar space The first is the space enclosing our neigh boring worlds the planets the sec ond is that which embraces those distant suns the stars and it is liter ally millions of times greater

There is no such abrupt change of scale in terrestrial affairs To obtain a mental picture of the distance to the nearest star as compared with the distance to the nearest pl you must imagine a world the clo est object to you is feet away—and then there el e to see until you have th u and miles

Many conservative palled by these denied that they car

Some people never learn, those who 60 years ago scoffed at the possibility of flight, and ten (even five!) years ago laughed at the idea of travel to the planets, are now quite sure that the stars will always be beyond our reach And again they are wrong, for they have failed to grasp the great lesson of our age—that if something is possible in theory, and no fundamental scientific laws oppose its realization then sooner or later it will be achieved

One day, it may be in this century, or it may be a thousand years from now, we shall discover a really efficient means of propelling our space vehicles Every technical device is always developed to its limit (unless it is superseded by something better) and the ultimate speed r

centuries or millenia will one da attempted Suspended animat already been achieved in the tory, and may be the key to i stellar travel Self-contained com arks which will be tiny traveli worlds in their own right may be a other solution, for they would mal possible journeys of unlimited e tent, lasting generation after ge eration

The famous Time Dilation effe predicted by the Theory of Relati ity, whereby time appears to pa more slowly for a traveler moving almost the speed of light, may be a third And there are others

Looking far into the future, there fore we must picture a slow (litt more than half a billion miles a hour!) expansion of human activ ties outwards from the solar syste

then the nearest star will be less than five years' voyaging from the earth

Our exploring ships will spread outwards from their home over an ever expanding sphere of space It is a sphere which will grow at almost—but never quite—the speed of light Five years to the triple system of Alpha Centauri 10 to the strange ly matched doublet Sirius A and B 11 to the tantalizing enigma of 61 Cygni, the first star suspected to possess a planet These journeys are long, but they are not impossible Man has always accepted whatever price was necessary for his explorations and discoveries, *and the price of Space is Time*

Even voyages which may last for

average five light years apart, other words, we can never get fro one to the next in less than fi years

To bring home what this mean let us use a down to-earth analog Imagine a vast ocean, sprinkled wit islands—some desert others perhap inhabited On one of these islands a energetic race has just discovere the art of building ships It is pre paring to explore the ocean, bu must face the fact that the ver nearest island is five years' voyagin away and that no possible improve ment in the technique of ship build ing will ever reduce this time

In these circumstances (which

)se in which we will soon find our ves) what could the islanders ıieve? After a few centuries, they ght have established colonies on ıny of the nearby islands and have .efly explored many others The ughter colonies might themselves ve sent out further pioneers and a kind of chain reaction would read the original culture over a adily expanding area of the ocean But now consider the effects of e inevitable unavoidable time lag ıere could be only the most tenu s contact between the home island d its offspring Returning mes ngers could report what had hap ned on the nearest colony—five ars ago They could never bring formation more up to date than at and dispatches from the more stant parts of the ocean would be om still further in the past—per ıps centuries behind the times here would never be news from the her islands but only history

ıdependent "Colonies"

All the star borne colonies of the ıture will be independent whether ıey wish it or not Their liberty will e inviolably protected by Time as ell as Space They must go their wn way and achieve their own des ıny with no help or hindrance from Mother Earth

At this point we will move the iscussion on to a new level and deal ith an obvious objection Can we e sure that the velocity of light is ndeed a limiting factor? So many impassible barriers have been hattered in the past, perhaps this one may go the way of all the others

We will not argue the point or give the reasons why scientists be lieve that light can never be out raced by any form of radiation or any material object Instead let us assume the contrary and see just where it gets us We will even take the most optimistic possible case and imagine that the speed of transpor tation may eventually become in finite

Picture a time when by the development of techniques as far be yond our present engineering as a transistor is beyond a stone axe we can reach anywhere we please in stantaneously with no more effort than by dialing a number This would indeed cut the universe down to size and reduce its physical im mensity to nothingness What would be left?

Everything that really matters For the universe has two aspects— its scale and its overwhelming mind numbing complexity Having abolished the first we are now face-to face with the second

What we must now try to visualize is not size but quantity Most people today are familiar with the simple notation which scientists use to describe large numbers it consists merely of counting zeroes so that a hundred becomes 10^2 a million 10^6, a billion 10^9 and so on This useful trick enables us to work with quantities of any magnitude, and even defense budget totals look when expressed as \$5 76 x stead of \$5 760 000 000

The number of other

own galaxy (that is, the whirlpool of stars and cosmic dust of which our sun is an out of town member, lying in one of the remoter spiral arms) is estimated at about 10^{11}—or written in full 100 000 000 000 Our present telescopes can observe something like 10^9 other galaxies and they show no sign of thinning out even at the extreme limit of vision

There are probably at least as many galaxies in the whole of creation as there are stars in our own galaxy but let us confine ourselves to those we can see They must contain a total of about 10^{11} times 10^9 stars or 10^{20} stars altogether 1 followed by 20 other digits is of course a number beyond all understanding

Before such numbers even spirits brave enough to face the challenge of the light years must quail The detailed examination of all the grains of sand on all the beaches of the world is a far smaller task than the exploration of the universe



And so we return to our opening statement Space can be mapped and crossed and occupied without definable limit but it can never be conquered When our race has reached its ultimate achievements and the stars themselves are scattered no more widely than the seed of Adam even then we shall still be like ants crawling on the face of the earth The ants have covered the world but have they conquered i what do their countless colon know of it, or of each other?

So it will be with us as we spre outwards from Mother Earth lo ening the bonds of kinship and u derstanding, hearing faint and l lated rumours at second—or th —or thousandth hand of an ev dwindling fraction of the en human race

Though Earth will try to keep touch with her children in the all the efforts of her archivists historians will be defeated by t and distance and the sheer bul material For the number of dist societies or nations, when our ra twice its present age may be greater than the total number o the men who have ever lived u the present time

We have left the realm of hu comprehension in our vain effo grasp the scale of the universe must always be sooner rather later

When you are next outdoors summer ni ht turn your head wards the zenith Almost vertic above you will be shining the bri est star of the northern skies—V of the Lyre 26 years away at speed of light near enough point of no return for us short l creatures Past this blue white l con 50 times as brilliant as our we may send our minds and boc but never our hearts

For no man will ever turn ho wards from beyond Vega, to again those he knew and loved the earth

What To Do—When Poisons Strike Home!

WHAT are you doing to protect your family against common household poisonings? Every year more than 4 million Americans are injured and 27 000 killed in home accidents Many are poisonings most are unnecessary Children are often the victims of adult negligence

All household poisonings are divided into three categories by the National Safety Council

CATEGORY ONE *If the patient is unconscious* a) take him to the nearest hospital immediately b) take the poison container label remaining contents any vomited material c) have someone notify your doctor

CATEGORY TWO *If the patient has swallowed kerosene gasoline or corrosives such as lye strong acids or alkalis* a) take patient to the nearest hospital immediately, b) have someone call your doctor

CATEGORY THREE *In all other cases* a) dilute contents of stomach by giving large quantities of warm water b) read the label on the container of poisonous substance and give patient antidote recommended c) if no antidote is recommended or if you do not have it available give one tablespoon of the Universal Antidote (see page 60)

In cases of poisoning knowing what *not* to do is just as important as knowing what to do Here are five don ts

DON T spend valuable time telephoning *ACT FIRST!*

DON T give an unconscious person anything to drink Take him to a hospital immediately

DON T try to make a patient vomit if poison is a lye or strong acid or alkali This serves only to aggravate throat and gullet burns

DON T try to make patient vomit if poison is kerosene, gasoline or solvent

DON T destroy poison container or label and DON T dispose of remaining contents or any vomited material until diagnosis is made

Prevention however, is the goal Here are some simple safeguards suggested by the AMA and the National Safety Council nonedible items must not be stored on food shelves items for external use only should be stored separately in a corner of the medicine cabinet, do not transfer poisonous substances to unlabeled containers identify poisons by adhesive taping lids or sticking pins in cork so they are identifiable by touch

Don t give prescription medicines to anyone except the person for whom prescribed never give or take medicine in the dark never tell children they are getting candy when

own galaxy (that is, the whirlpool of stars and cosmic dust of which our sun is an out of town member, lying in one of the remoter spiral arms) is estimated at about 10^{11}—or written in full 100 000 000 000 Our present telescopes can observe something like 10^9 other galaxies and they show no sign of thinning out even at the extreme limit of vision

There are probably at least as many galaxies in the whole of creation as there are stars in our own galaxy but let us confine ourselves to those we can see They must contain a total of about 10^{11} *times* 10^9 stars or 10^{20} stars altogether 1 followed by 20 other digits is of course *a number beyond all understanding*

Before such numbers even spirits brave enough to face the challenge of the light years must quail The detailed examination of all the grains of sand on all the beaches of the world is a far smaller task than the exploration of the universe



And so we return to our opening statement Space can be mapped and crossed and occupied without definable limit but it can never be conquered When our race has reached its ultimate achievements and the stars themselves are scattered no

The ants have covered the world but have they conquered it—what do their countless colonies know of it or of each other?

So it will be with us as we spread outwards from Mother Earth loosening the bonds of kinship and understanding hearing faint and belated rumours at second—or third—or thousandth hand of an ever *dwindling fraction* of the entire *human race*

Though Earth will try to keep in touch with her children in the end all the efforts of her archivists and historians will be defeated by time and distance and the sheer bulk of material For the number of distinct societies or nations when our race is *twice its present age may* be greater than the total number of *the men* who have ever lived up to the present time

We have left the realm of human comprehension in our vain effort to grasp the scale of the universe s*o it must always be sooner rather than* later

When you are next outdoors on a summer night turn your head towards the zenith Almost vertically above you will be shining the brightest star of the northern skies—Vega *of the Lyre* 26 years away at the speed of light near enough the point of no return for us short lived creatures Past this blue white beacon 50 times as brilliant as our sun we may send our minds and bodies but never our hearts

For no man will ever turn homewards from beyond Vega, to greet again *those he knew and loved* on the earth

What To Do--
When Poisons Strike Home!

WHAT are you doing to protect your family against common ousehold poisonings? Every year iore than 4 million Americans are ijured and 27 000 killed in home ccidents Many are poisonings iost are unnecessary Children are ften the victims of adult negligence

All household poisonings are di ided into three categories by the ational Safety Council

CATEGORY ONE *If the patient is nconscious* a) take him to the earest hospital immediately b) il e the poison container label re aining contents any vomited ma rial c) have someone notify your octor

CATEGORY TWO *If the patient s swallowed kerosene gasoline or rrosives such as lye strong acids r alkalis* a) take patient to the earest hospital immediately b) ive someone call your doctor

CATEGORY THREE *In all other ases* a) d lute contents of stomach by giving large quantities of warm pater b) read the label on the con tainer of poisonous substance and give patient antidote recommended c) if no antidote is recommended or if you do not have it available give one tablespoon of the Universal An tidote (see page 60)

In cases of poisoning knowing what *not* to do is just as important as knowing what to do Here are five don ts

DON T spend valuable time tele phoning *ACT FIRST!*

DON T give an unconscious per son anything to drink Take him to a hospital immediately

DON T try to make a patient vomit if poison is a lye or strong acid or alkali This serves only to aggravate throat and gullet burns

DON T try to make patient vomit if poison is kerosene gasoline or solvent

DON T destroy poison container or label and DON T dispose of remain ing contents or any vomited material until diagnosis is made

Prevention however is the goal Here are some simple safeguards suggested by the AMA and the Na tional Safety Council nonedible items must not be stored on food shelves items for external use only should be stored separately in a cor ner of the medicine cabinet do not transfer poisonous substances to un labeled containers identify poisons by adhesive taping lids or sticking pins in cork so they are identifiable by touch

Don t give prescription medicines to anyone except the per whom prescribed never medicine in the dark never dren they are getting

they are given medicine, read labels before giving or taking medicine—check dosages carefully

Dispose of medicines no longer needed by flushing down toilet immediately, and never re-use containers of chemical items

Finally, remember many substances—household commercial, industrial—not labeled *poison* can be poisonous, especially if taken by a child Large quantities of aspirin for instance can be fatal Don t take a chance—treat as a poison any substance eaten by a child that is not food

Dr Harol Jacobziner New York Department of Health stated that more children under 5 years of age in New York died last year from accidental poisonings than from diphtheria, poliomyelitis rheumatic fever, scarlet fever and other streptococcic diseases combined

Here is a general antidote for a great many poisons Your druggist should have it If not ask him to use this recipe Keep it on hand at all times

Universal Antidote *(purchased)*

2 tablespoons pulverized charcoal
1 tablespoon magnesium oxide
1 tablespoon tannic acid

Dosage 1 heaping tablespoon in small glass of water

The following is a substitute for the regular Universal Antidote

Universal Antidote *(Made at home)*

1 slice toast, *burned black* and crumbled
1 tablespoonful Milk of Magnesia
1 cup strong tea, warm or cold

POISONS

Acids · 18
Bichloride of Mercury · 6
Camphor · 1
Carbon Monoxide · 16
Chlorine Bleach · 8
Disinfectant
with chlorine · 8
with carbolic acid · 12
Food Poisoning · 11
Furniture Polish · 17
Gasoline, Kerosene · 17
Household Ammonia · 1(
Insect & Rat Poisons
with arsenic · 2
with sodium fluoride · 14
with phosphorus · 5
with DDT · 11
with strychnine · 15
Iodine Tincture · 4
Lye · 10
Mushrooms · 11
Oil of Wintergreen · 9
Pine Oil · 17
Rubbing Alcohol · 9
Turpentine · 17
Washing Soda · 10

OVERDOSES

Alcohol · 9
Barbiturates · 3
Belladonna · 15
Bromides · 11
Codeine · 13
Headache & Cold Compounds · 9
Salicylates (aspirin) ·
Iron compounds · 7
Morphine, Opium · 13
Paregoric · 13
'Pep' Medicines · 2
Sleeping Medicines · 3

do this first

Send for a doctor—immediately.

Keep the patient warm.

Determine if patient has taken *(1)* ***A POISON***· *something not meant to be taken internally . . or (2)* ***AN OVERDOSE***· *a food or drug taken in excessive quantity.*

While waiting for physician, give appropriate counterdose below.

- But do not force any liquids on the patient—if he is unconscious.

To Find the Correct Counterdose

- In one of the lists printed at left, find substance causing the trouble.
- Next to that substance is a number. This refers to counterdose bearing same number in the section below.

Keep all poisons and medicines out of reach of children

Induce vomiting with an emetic such as
- Tablespoon of mustard in half glass of water, or
- Soap & warm water, or
- Salt & warm water, or
- Finger in throat

2
- Give a mixture of 2 tablespoons of activated charcoal 1 tablespoon of milk of magnesia, 6 tablespoons strong tea
- Induce vomiting (#1)

3
- Give mixture as in #2.
- Induce vomiting (#1)
- Give 2 tablespoons epsom salt in 2 glasses of water
- Then give large quantities of hot coffee or strong tea (instant or regular).

4
- Give 2 ozs thick starch paste Mix cornstarch (or flour) with water
- Then give 2 ozs salt in quart of warm water Drink until vomit fluid is clear
- Finally, give glass of milk

5
- 4 oz hydrogen peroxide
- 1 tablespoon sodium bicarb in quart of warm water
- Induce vomiting (#1)
- Then give 4 oz mineral oil Positively do NOT take vegetable or animal oil

6
- For each tablet swallowed give white of 2 raw eggs in glass of milk
- Give mixture as in #2
- 1 ounce of epsom salts in a pint of water.

7
- Induce vomiting (#1)
- Give 2 teaspoons of sodium bicarb in a glass of warm water

8
- Give 1 teaspoon of aromatic spirit of ammonia in glass of water
- Hot coffee or strong tea plus white of raw egg

9
- Give mixture as in #2
- Induce vomiting (#1)
- Tablespoon sodium bicarb in quart of warm water
- Give strong tea or coffee

10
- Give 2 tablespoons vinegar in 2 glasses of water
- Give white of 2 raw eggs or 2 ounces of olive oil
- Do NOT induce vomiting!

11
- Induce vomiting (#1)
- Give 2 tablespoons epsom salt in 2 glasses of water
- Then give large quantities of hot coffee or strong tea

12
- Induce vomiting (#1)
- Then give 2 ounces of castor oil
- Next give glass of milk or whites of 2 raw eggs.

3
- Give mixture as in #2
- 2 tablespoons epsom salt in 2 glasses of water
- Keep patient awake

14
- Give 2 tablespoons milk of magnesia
- Give glass of milk
- Induce vomiting (#1)

15
- Give mixture as in #2
- Give artifical respiration
- Keep patient quiet.

16
- Carry victim into fresh air
- Make patient lie down
- Hot coffee or strong tea

17
- Give 4 oz mineral oil
- Then give hot coffee or strong tea

©American Druggist

18
- Give 1 oz milk of magnesia in ' quantity of
- Do NOT in



How To Live Longer

New Views About Aging and Ways to Halt It

by Roy Gibbons

Condensed from The Chicago Tribune

SCIENTISTS are hard at work trying to fathom the mystery of why humans grow old

The scope of the inquiry into aging is indicated by a 939 page volume entitled the *Handbook of Aging and the Individual*, released recently by the University of Chicago Press

Doctor James E Birren, a psychologist and chief of the section on aging of the National Institute o Mental Health at Bethesda, Md , i editor of the volume to which 28 scientists and scholars have con tributed Dr Birren says that re search on aging is new and that only the frontiers of the subject have been touched

It is also his opinion, to which many other investigators subscribe that longevity is a matter of hered ity, provided a person escapes the scarring effects of disease and other biological injuries

Because medical science has made great strides in the conquest of many

fectious ailments, Dr Birren be ves that when the youth of today aches old age there might very well a different kind of old people

It is wholly conceivable he says at within 25 years a person who 75 years old may have the bio gical age of today s 65 year old cause he will have been subjected fewer diseases in his lifetime

In other words Dr Birren ex ains, a person is born into the rld with a certain amount of vital pital If this biological currency s not been paid out in the con est of infection the person will d up with greater reserves for a ger voyage in the ship called life

Many scientists contend there is definite proof that old age is not e result of some specific process ch as a toxin impairing the body s tal functions

More are inclined to believe how er that senescence comes from a eakdown of organ systems such as e heart the liver and the kidneys

Doctor Albert I Lansing of the niversity of Pittsburgh school of edicine says on this score Quite art from the capacity of dupli tion of whole organisms by re oduction and cell duplication by itosis (division) there is a truly markable ability of protoplasm to new itself as it is consumed by tal activities

Shoes piston rings and auto obile tires wear out because of stained friction Rubber bands xidize and become inelastic with e passage of time and clocks run own'

None of these failures Dr Lans ing says, is the same as the aging of living things

Another scientist has asked "What mechanism is it which per mits such abundant growth and cell division up to maturity and then not only brings these processes to an end but to a steady and fatal decline?

Long-Life Serum?

Along this line of reasoning the late Dr Alexander A Bogomolets a Russian scientist created in 1940 quite a stir in medical circles by an nouncing development of a serum for prolonging human life

It was Bogolomets contention that humans should live at least 150 years and to this end he devised his anti aging preparation which was called A C S meaning antireticular cytotoxic serum

The substance derived from the blood of horses into which human spleen and bone marrow had been injected was supposed to stimulate what is known as the body s reticulo endothelial system a network of cells found in all tissues but concen trated especially in the liver spleen, and bone marrow

These cells found in all living creatures are concerned with the maintenance and repair of tissues One of their functions is to act as scavengers by digesting cellular de bris and also repel invasion by harm ful bacteria

The serum allegedly showed bene ficial re ults in wound healing and is also said to have rejuvenated some human subjects It never won ac

ceptance in this country but was widely acclaimed in Russia and France

Further work on the serum was abandoned in 1946 when Bogolomets died of what the Soviet Council of Ministers termed a "grave disease" Whether he took his own medicine was not disclosed

Many other views about aging and ways to halt it have been advanced



by hundreds of other persons most of them not scientists who were con sulted simply because they happened to live for a long time

One such individual—a 4 foot 4 inch South American Indian—was subjected to rigorous medical exami nation by New York City medical authorities in 1956 when the wizened ancient from Colombia claimed to be 176 years old

Doctors said Javier Pereira who died in 1958 might have been 150 when they saw him but admitted lack of any scientifically foolproof method to affirm or deny his exact age

Through an interpreter, Pereira professed to recall events from the days of Simon Bolivar, who died in 1830 after liberating much of South America from Spanish rule

Medical tests showed the spry little Indian's blood circulation was that of a youngster and that his heart and blood pressure had un-usual vigor He said he drank he could get it, smoked when to do so, and had outlived wives

Other oldsters have ascribed longevity to a variety of ca many of them of dietary origin cluding indulgence in, or compl abstinence from such things whisky tobacco, wild onions vegetables, and a long list of o substances

In some European countries ho meat is eaten exclusively by pers who claim it has medicinal va For every theory promulgated add years to the normal life s there are contrary views which cule the idea

Very few humans really die c age it is claimed Death us comes from some intervening c associated with the breakdow vital processes such as the ca vascular system which today most senior citizens or failure o of the organs such as the kid or liver which give little war until they start getting into tro

Exceptions to this rule do oc One was Walter W William Confederate veteran and last of 4 million men who fought in Civil war

He died last Dec 19 at 117, a recovering from another bout pneumonia The physician who tended him said Williams did succumb to any observable dis or breakdown but of a general w ing out true of old age

The old soldier's veins and arte were easily compressible and sim

o e of a man 70 it was reported doctor ascribed Williams s un l longevity to heredity and to a l life free of stress and tension

thdays Not Meaningful

he measure of a man s age is best rmined by the number of his ldays—his chronological age ctually this is the least mean al kind of measurement because humans do not grow old uni ily Moreover a man of 60 let ay might very well have a body ell preserved as that of a much nger person

is likewise true that the age of various organs may vary in the e individual Thus a 60 year old i might have 30 year old eyes a 40 year old liver The opposite ourse is equally true

nvestigators have been turning some leads which though not too nite show promise of cracking ts of the riddle of aging

One procedure having to do with lood test for determining the state biological aging is under investi ion at Creedmoor Institute for ychobiologic Studies at the Creed or State hospital New York ere it was developed by Dr Leon e Goldschmidt

he test confirms by microscopic hniques that humans do not age the same rate (See SCIENCE GEST May 60 —Ed)

In addition to the blood test for ing there is also what is called e skin test, which any person may rform to give some indication of s biological years

To make this test simply lift up the skin on the back of the hand and hold it there for a moment or so In biologically young persons the skin when released will quickly as sume its normal position But if the person is old both in years and more importantly by biological stand ards a ridge will be maintained for more than half a minute or so

The reason the old skin cannot recover so rapidly is because it has lost its elastic fibers it is explained Young skin on the other hand is able to snap back into place almost immediately This is part of the bounce which goes with youth

Doctor Frederick C Swartz of Lansing Mich chairman of the committee on aging of the American Medical Association says there are practically no diseases peculiar to the aged

There are simply diseases amon the aged which is a far different thing Dr Swartz contend Hard



ening of the arteries is no worse than softening of the will to live

Many people feel old one day and young the next It is a matter of mental attitude authorities explain Because the aging process is so com plicated many experts say they doubt whether most persons really know their own age

Studies conducted by sociol and psychologists have d that many well adjusted

women who have passed the 60 and 70 year mark, and are even in their 80s still think of themselves as middle aged

Doctor Edward L Bortz of Philadelphia former A M A president and president elect of the American Geriatrics society also stresses the importance of proper motivation as a life saving attitude for the nation s senior citizens

To taste the rich essence of mature living one must drink deeply to enjoy the real savor of life at its best Dr Bortz says It is an invitation to growth to an enlarging experience



The extended life span which we all can now attain requires an eager desire to keep going to keep growing It is an exceedingly personal quality If enforced retirement results in an aimless leisure inevitable deterioration usually occurs

Since 1950 the number of Americans 65 and over has jumped to 15 million Population experts predict it will climb to approximately 30 million by 1980 while the percentage of those between ages 25 and 44 will decline

There is every reason to believe that in living longer humans of the future are certain to be healthier in both body and mind says Dr Theodore G Klumpp a member of the American Medical Assoc[iation] committee on aging

Our older citizens are ... than they used to be Med... ence has not only added ... their lives but is making rapid ... ress in adding life to their years ... even more important object ... practice of geriatrics the exp... contend

Don't Raise Your Voice

Doctor Morris Fishbein Ch... medical educator and former ... of the *Journal of the Am... Medical Association* says th... of progress being achieved by ... cal research makes it entirel... ceivable that 10 to 20 useful ... will be added to the average lif... in the not too distant future

To live a long time don... your voice he advises By ... ing in calm tone you avoid ... one of the principal causes of a...

Stress activates the body s ... glandular system putting ... strain on defense mechanisms ... stress factor also includes th... position of physical hurts and ... pressures such as worry abou... ing too little or too much o... world s goods he explained

Doctor Fishbein said that ... ress is being made to help the ... retain their vigor Such stride... seen in new enzyme pre... and glandular extracts incl... those from the thyroid found i... neck and the pituitary, the b... master gland situated in the b... he disclosed

New kinds of pituitary st...

on the verge of being introduced he medical profession, he re-ed The preparations contain re ly isolated growth factors that rol such things as pigmentation e skin and even the growth of

t looks as if we finally may be to do something about hair ' Dr Fishbein said This is so important for humans But e new substances work they l mean a lot to farmers by in ing the wool yield from sheep "

nother achievement, he said is development of a new kind of mic acid, one of the basic sub ces or building blocks from h all protein is made

e brain cells are rich in glu-c acid which previously has administered in attempts to the intelligence levels of men retarded children It also is n to older persons to improve n nutrition, especially in in ces where the cerebral arteries hardened to produce senility

he new glutamic acid prepara seemingly is able to pass an ruction called the blood brain ier, and thus enriches the brain in their need for this substance

octor Herman N Bundesen ago's veteran health commis er, has his own method for keep young

undesen who was 78 on April says his health is excellent and

undesen's technique for fighting off surplus poundage, which he indicts as one of the principal causes of premature death and aging, is his own brand of abdominal exercise

Every day, for at least two hours, and during what he terms "wasted time," he moves his abdomen up and down, drawing the visceral contents upward in the direction of his chest.

This kind of silent manipulation, he asserts squeezes the liver, kidneys spleen and other internal organs and also aids the prostate gland

"Anyone can do this exercise and do it on wasted time ' Bundesen says ' Wasted times are those inter-



vals when you are talking on the telephone listening to people, waiting for a bus "

The procedure according to Bundesen squeezes all the fat out of the internal organs and gives muscle tone to the abdomen

Bundesen weighs 155 pounds and hasn t varied more than two pounds from that mark in years He has been doing the exercise for at least 25 years

7 Rules for Staying Young

The way to a ripe old age through pills, tonics, or rejuve the American Medical As concludes It recommends f these seven rules to stay spirit body and mind

1 See your family phy

women who have passed the 60 and 70 year mark and are even in their 80s still think of themselves as middle aged

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7 Rules for Staying Young

The way to a ripe old age is not through pills, tonics, or rejuvenators, the American Medical Association concludes It recommends following these seven rules to stay young in spirit body, and mind

1 See your family physician reg-

ularly He can diagnose and treat almost any disease if he finds it early enough He can help you stay young

2 Watch your diet No one can feel young and peppy when he s toting an extra load of weight

3 Get adequate rest for both your mind and body Your body is a machine and your brain is its pilot and both can weary from over exertion Take each job as it comes and don t tackle everything at once

4 Pursue physical exercise The mark of an old man or woman is creaking joints aching backs and a myriad of complaints Keep all the parts in good working order by using them A mild amount of exer cise never hurt anyone in good health—such as mowing the lawn a brisk walk to work or any moderate sport that expels the poisons of fatigue and prevents the rust of idle ness

5 Fill your days with productiv ity The quickest way to old age is through boredom so keep up interest in your work and roundings Fifty years ago a woman of 65 was ready for ing chair But that certa nly true today

6 Participate in communi fairs Some people pursue the of fussing and fretting about selves at home alone But want to be among the happie ple—the doers—share your t talents

7 Prepare for your future cial needs Many worries ab morrow can be avoided if y today There are now many lent retirement programs a to individuals and employee which assure you a continuin fortable income during reti Budgeting for medical needs achieved thru private health ance

Remember you can stay only if you re prepared for the and that is as near as tomorr



Silver Is Given New Atomic Weight

An atom of silver weighs less than previously thought but this new find ing of the National Bureau of Stand ards will not affect the silver dimes in your pockets

The new atomic we ght of silver was set at 10 8 3 through accurate meas urements with a mass spectrometer The atom c weight currently u ed is 107 880

A pound of silver will still be a pound of silver to the layman but chemist a pound of silver will —theoretically at least—more than it formerly did

The more precise atomic of silver may mean that the weights of other elements may be adjusted Silver has been used the atomic we ghts of certain elements

Biggest radio telescopes show how we might receive signals

Trying to Talk With Other Planets

by Arthur Koestler

lensed from The London Observer

ʹE ARE MOVING into the space
age much faster than the news
ates The news is mainly con
:d with rockets and satellites
h are clumsy hardware slowly
ing through cosmic suburbia

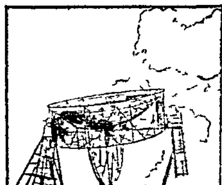
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ity This experiment was per
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s from us

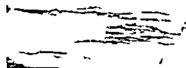
un establishing radio commu
tion with other planets in our
xy

his contains some 100 000 mil
stars and if only one in a
ion among these has a planetary
em comparable to ours there
would still be, by the laws of prob ability 100 000 of them inhabited by some sort of intelligence, float ing through the Milky Way

On the very day of my visit to the Jodrell Bank telescope, the papers had published a letter from two American astronomers suggest ing that the telescope s operators should make a point of listening in to possible meaningful signals even suggesting the most likely wave lengths for communication

While driving to Jodrell Bank, Prof Lovell of Manchester Univer sity who heads the telescope team discussed with me the subject of interplanetary semantics—with that face saving semiseriousness which is the fitting scholarly attitude on ap proaching the fantastic Assuming that one day on a certain wave length and from a certain direction in space the little pen which records the incoming impulses in red ink on





the revolving drum was obviously trying to say something—that is, that the sequence of impulses displayed a clearly articulated pattern, as, for instance, a Morse signal sequence—what is one to do next?

Evidently one would try to ' break the code of the sequence of blip blips This however, presupposes some common language and the only imaginable common language with the bug eyed inhabitants of another planet would be the language of mathematics If the signal were, for instance 9 16 25 we would know at once that they are familiar with the Pythagorean theorem and it would then perhaps become possible to establish a common symbolic language which would embrace quantitive relationships and also a good deal of formal logic



It may or may not also be possible to identify and name chemical elements (by repeating the sequels of atomic numbers or the spacings of their linear spectra) and so get to chemical compounds

But whether we would ever succeed by this method in conveying the meaning of ' We have four legged animate things which bark and bite ' not to mention ' And how dies the wise man? As the fool " is a fascinating problem for linguistic philosophers

Helen Keller was born deaf and blind, and the first break t communication was through ' signals which her teacher into her hand But firstly both equipped with the same of cerebral computer, and the teacher could place the hand on the object while namin symbols

An additional difficulty is The planets around our own su almost certainly unfit to sup higher forms of life as we u stand it and the closest al en Alpha Centauri is five l ght away By the laws of cannot expect the nearest have suitable planets this that to get an answer to a will take a minimum of fi more likely several hundred it will be a game of corresp chess of Olympic duration

We need not however w the answer and could go on mitting a whole correspo course in symbolic logic unti century or so the answers be arrive The method might of c give rise to some slight misu standings

However opinions on this i are sharply divided While th thusiasts at Jodrell Bank are vinced that radio communic with planets in the neighborin gions of our galaxy is feasibl virtually within reach Prof ' who occupies the chair of omy at Manchester Universit of the opposite opinion

While Jodrell Bank believes about one megawatt would be

to reach out to Alpha Cen and beyond, Kopal believes e shall never be able to gen ufficient energy to send pulses ır—short of blowing up our

reason for this astonishing :nce of opinions is partly our nce of the exact conditions ing in interstellar space and the newness of radio astron not since the days of Galileo e telescope was there such un ty as to what a new gadget d cannot do

ıpe Is 'Creepy" Thing

ast we arrived at the foot of nstrous floodlit Thing Even ıad seen photographs of it, the sight surpassed expectation ›ramids and the Sphinx are a ointment to the tourist be their balanced proportions him unaware of their huge

the monster telescope of l Bank is a surrealistic, creepy ın, a single gigantic hollow s eye made of steel, 80 yards neter over an acre in surface ıded between two lattice tow- hich actually creep on elec- › driven bogies around a cir- track 350 feet in diameter to ract the earth's rotation, the hollow eye itself moves up or down on its gear of s and racks taken from the ırrets of the erstwhile British ship *Royal Sovereign*

n wet day that hollow eye collect four tons of rain but for the ducts through which it weeps them away Suspended beneath the center of the eye is a laboratory, hanging on pivots on its rims, the eye carries red and green navigation lights to warn off low flying aircraft

Altogether this Thing has a kin of colossal impertinence An opt telescope however large, is a glorified opera glass, watching the stars But this naked parabolic steel

ister like an empty eyesocket, and yet it can penetrate farther into space, it does not watch, it spies by means of invisible waves emitted by invisible sources

The largest telescope has a range of about 2 000 million light years, the eye at Jodrell Bank is believed to be catching pulses emanating from even more distant sources

One is tempted to ask What does it matter? since imagination has long been defeated by the hoary deep yet it does matter and for a simple reason We are now probing regions of the universe close to the frontier beyond which we shall never be able to penetrate regardless of any further technological progress Again the reason is simple In this expanding world all galactic clusters recede from one another and from us at speeds which are proportional to their distance the farthest away the faster they run

The most distant objects reached by the optical telescope are believed to recede at nearly half the ve- light (The speed of light is a- speed of radio waves) Doubl distance and you have reache limit—for objects which recede us faster than the speed of light gone around the cosmic bend. ever, beyond our range Out of world they cannot fall but as f we are concerned they have c to exist

At least that is what matter like according to present cos ical theory This however is a state of transition and controversy which ranges fr sober question whether ext tions on this scale are per at all to impassioned arg about the origin of the unive

• • •

The monster of Jodrell Ba perhaps not decide the issue, chances are that within the n years it will contribute more its solution than the sensation from the satellites around us

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What Is an Ephebiatric Clinic?

THROUGH COMMON USAGE the terms teen ager and 'adolescent have lost their original meaning for both patient and parent The general public tends to link the terms with 'juvenile delinquency'

The patients (14 to 19 years of age) have expressed a desire for a name

... literally meaning approaching manhood the term is much more workable and less awkwa either of the older names] seem genuinely appreciative change in name

That the practice of ephebia relatively new is proven time a again when staff members drop office asking what an ephebiatri is The ephebiatrician often fe a medical missionary whose fun to define his area of interest a explain the rationale for its ex

—*The New Ph*

BEFORE THE BABY IS BORN

facts about pregnancy

by *James C Spaulding*

Condensed from The M lwaukee Journal

ΤOMAN S PHYSICAL SUPERIOR ITY is seldom so obvious as ng pregnancy

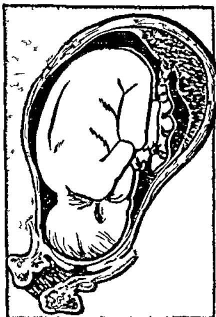
ie becomes temporarily a dif it person as her circulation thing metabolism and body nistry change to meet the needs ne growing fetus Her person ' tends to nge, too

he most re kable differ occurs in the us the re luctive pouch re the ferti l egg is im ted Before gnancy the us is only ut 2 1/2 inch ong and near olid

ear the end pregnancy it become a thin led muscular more than a long nine ies wide and it inches deep Its capacity has ea ed about 520 times and its ght not including the contents increa ed by 3? time

ndividual mu cle cell in the rus begin enlarging early in preg nancy because of more female hor mones in the blood Later they expand from the growth of the fetus inside

Blood and lymph vessels in the uterus expand to supply the fetus with oxygen and nutritional sub stances and to carry away metabolic waste products



By the end of the fourth month the uterus usually becomes too large to remain within the pelvic cavity and forms a tu mor in the ab domen

It presses against the ab dominal wall, pushing the intes tines aside Still later it pushes against the dia phragm displac ing the heart up-ward forward and to the left The chest cavity is shortened but its circumference is increased so that there is an acutal increase in the vital capacity of the lung

Blood volume increases To pump the 30 percent more blood the mu t work harder By the last month of pregnancy it is pump

about 1/3 more blood per minute than before pregnancy

The greater tendency to faint while pregnant is caused by shunting of blood from the brain to the uterus and digestive tract The tendency is aggravated when a woman enters a warm room from the cold outdoors because skin blood vessels dilate taking still more blood from the brain One obstetrician said that churches and supermarkets were the most common fainting places according to reports of his patients

Endocrine glands enlarge and produce more hormones in pregnancy The thyroid gland in the neck grows noticeably In ancient Rome a close fitting gold necklace was fastened around the bride s neck When the necklace became tight it was a sign she was pregnant

Greater thyroid function is associated with a rise in the metabolism of the fetus

The pituitary gland in the brain sometimes doubles in size Its increased output of hormones may be a cause of thickening of facial features in pregnancy The adrenal glands, lying on top of the kidneys, also overgrow

Increased secretion of female sex hormones, both by the mother and the placenta—the exchange organ between the mother and the fetus—is one of the essential changes

JUST BEFORE BIRTH, the fetus contains about an ounce of calcium in the bones Of the mother's stored calcium almost two thirds is drained in the last month The mother also transfers iron to the fetus at the rate in the last one third of nancy as in the first two-thirds.

Water retained in spaces be the mother's body cells is el a few days after the baby is by excretion from the kidne profuse sweating

Among about 12 000 pregnan the average total weight 24 pounds half of it, in the three months and only two p in the first three

About half the weight g accounted for by the fetus a contents of the uterus, and t by the mother in fat, prote water in the body and blood

Brown patches sometimes on the face and neck Called ma or 'mask of pregnancy may be a result of excess hormones

So called vascular spiders, fiery red elevations of blood with branching legs, occur face, neck and upper arm chests of many pregnant w Some experts believe that th centration of female hormon the tissues is the cause

The old belief that a woman a tooth for every child has no tific basis, but pregnancy is k to hasten existing dental deca is not a cause of tooth cavities, ever

Mild emotional depression mal in pregnancy, and the are thought to be both and biochemical ' Pregnancy b are characterized by spells of crying or extreme irrita

ar about pregnancy are com but obstetricians believe there ewer fears now because of edu 1 and the low maternal mor rate

nong the commoner fears are of physical attractiveness giv irth to a defective child lo s of husband s love and being an quate mother

zarre cravings apparently are al in pregnancy A British y indicated that fruits and raw tables were most commonly ed among foods Others often ed were pickles candy and dry ils

egnant women in the study also ed such nonedible substances as , soap toothpaste mothballs line tar metal polish wood h chalk and charcoal

udies of hundreds of pregnan show that they vary in duration 1 about 231 to 329 days from ception to delivery The average 70 days

he upper limit can be important n a legal aspect In 1921 an li h court ruled that a baby de red 331 days after the husband home was legitimate

'regnancy after the age of 47 is : At Johns Hopkins hospital re was only one older reported 65 000 pregnancies The woman d she was 49 but was feeble aded and might not have known correct age

The younge t authenticated preg ncy was Lina Medina of Lima ru who was either 4 years 8 onths old or 5 years 8 months old when she was delivered of a 6 1/2 pound boy by cesarean section in 1939 Several American doctors in Peru at the time saw the mother and said she appeared to be about 5

THERE ARE OCCASIONAL cases of false pregnancy or pseudocyesis Usually this involves a woman who wants to be pregnant but fears hav ing a baby She develops nearly all of the normal pregnancy symptoms including weight gain breast en largement cravings and even even tually labor pains



One such case reported recently was examined by a doctor regularly through the eighth month of a presumed pregnancy gaining 35 pounds and showing other signs

When she was referred to a spe cialist for delivery he discovered that she was suffering from pseu docyesis and told her so This di turbed the woman but not as greatly as it did her husband He became hysterical and had to be hospitalized and treated by a p y chiatrist

For many women nau ea and vomiting probably is the most severe problem in pregnancy Its cau es are not clearly understood but are no longer thought to be primarily psychological Morning sickness,' as it is called can be so severe it threatens the woman s life drugs can help control the di

about 1/3 more blood per minute than before pregnancy

The greater tendency to faint while pregnant is caused by shunting of blood from the brain to the uterus and digestive tract The tendency is aggravated when a woman enters a warm room from the cold outdoors because skin blood vessels dilate taking still more blood from the brain One obstetrician said that churches and supermarkets were the most common fainting places according to reports of his patients

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BOOKS

HEART A HANDBOOK
LAYMEN by H M Marvin
Doubleday $4 50) Dr Marvin
president of the American Heart
ition discusses with clarity and
the problems of heart patients
amilies and their friends This
onsiders and discusses conflicting
is on such subjects as cholesterol
blood and the effects of tobacco
heart

OUT edited by John M Fowler
foreword by Adlai E Stevenson
Books $5 50) A balanced and
tandable account of nuclear
ns and the multitude of hazards
have created for mankind The
s weigh the contamination of our
y fallout describe the results of
thetical nuclear war and answer
cal questions at issue on banning
tests

MYSTERIOUS EARTH by
del Rey (Chilton $2 95) An
to unusual questions such as
composes the earth s center?
our ancient ancestors giants? Are
sea serpents? Has the pole a
r pattern of movement? For
people

THE BRIDGE BETWEEN
WORLDS by Franz E Winkler
(Harper $5 00) Dr Winkler be
man stands poised between two
—the outer world of fact (the
d) and his own virtually unex
l world (the creative)—knowing
e cannot live alone in either but
must forever make his home in both if
he is to continue to live To the author
the cure for the illness of our time lies
in a systematic training of man s in
tuitive faculties

THE POISONS IN YOUR FOOD by
William Longgood (Simon & Schuster
$3 95) Since 1956 the author has been
tracking down the story of what has
happened to food and contends that the
problem of chemicals in food has built
up to a crisis Some chapter headings
The Poisons You Eat Bug Killers
in Every Bite Test Tube Meat

THE WORLD OF LIGHT by John
Stewart Collins (Horizon $3 75) A
British journalist explains what light
is and what it does so that a reader
...nde stand

ELECTRONIC COMPUTERS by
T E Ivall (Philosophical Library
$15 00) This book is an introduction
for those who are beginning to take an
interest in electronic computers How
ever it is not a book for the layman
but rather for those persons who are
likely to become involved in some spe
cialized aspect of electronic computing
either as users or as electronic designers



(The books listed above are
available from SCIENCE DIG
may be obtained from their pu
ers, and, usually, from

BUNSEN and KIRCHHOFF



Spectroscopy



by W G Lipsett

ONE OF THE MOST AMAZING achievements of the modern astronomer is that he is able to tell with such certa nty and from such an incredible distance away of what materials the sun the nebulae and the stars are made

He can tell us much about the physical state of the planets and can calculate the temperatures and pres sures in the outer layers of many stars tell how dense they are and trace their electromagnetic fields He can judge quite accurately the speeds at which certain stars and star systems are speeding towards or racing away from our own galaxy or the rate at which the components of the expanding universe are flying apart

An instrument known as the spec troscope enables him to perform these wonders and this same device gives workers in other fields of sci ence powers of detection and dis covery just as sensational

The criminal investigator uses the spectroscope to analyze and identify minute fragments of stances—clues found on the s a crime

By using it the biologist a ologist can detect in anim plant life and in the eart traces of certain health or promoting elements in amo infinitesimal as a billionth a gram

With it the metallurgist cover or control the ingredi an alloy and it has given the physicist a picture of the a ments of molecules and aton therefore some idea of the st of matter itself These are bu of the spectroscope s many u

We owe the invention of th troscope and the development science of spectroscopy to twc tists—Robert Wilhelm von I and Gustav Robert Kirchh was their simple invention ar neering work which opened th to a glittering treasure-che knowledge and benefit to all kind

When Bunsen and Kir teamed up in 1859, Bunsen wa 48 and Kirchhoff only 35, bu

already achieved much inde dently

oth scientists were born in rch—Bunsen in Gottingen on rch 31, 1811, and Kirchhoff at ngsberg in Prussia on March 1824 Both men were interested cience at an early age

unsen—Practical Chemist

lunsen s interest lay in chemistry ot in theoretical speculations

3

! became a lecturer in chemistry 1839 when he was 28 he was ointed associate professor of mistry at Marburg University in 1852 professor of experi ital chemistry at Heidelberg versity where he was to remain il 1889

Bunsen first won fame by his re rches into certain compounds of enic He was a bold and adven ous person and some of his ex iments almost cost his life from emical poisoning In an explo n which took place in his labora y he lost the sight of one eye

Bunsen was more than a brilliant earch chemist He was a clever entor interested always in the ictical side of things In 1841, he ented a new type of carbon zinc ctric accumulator or cell a use- filter pump and a series of instru nts called photometers for meas ing the intensity of light

It was with his new electric or voltaic cell that he first obtained the element magnesium in metallic form and he showed how intensely it burned in air

Although Bunsen laid the founda tions of modern organic chemistry, he was chiefly interested in the study of gases He examined the gases given off by blast furnaces in Eng land and Germany and found that almost 80 percent of the heat was being lost in the waste of factory gases He even went off on a scien tific expedition to Iceland in 1846, to study the natural geysers so com mon in that land

Out of Bunsen s scientific absorp tion with gases was eventually to come the invention of the burner which bears his name although some authorities say that credit for the design should go to Peter Desdga or perhaps to Michael Fara day who had also built a burner on the same principle

The Bunsen burner—a gas burner widely used for heating substances in scientific laboratories—consists of a metal tube with two openings at the bottom and a hose connecting the tube to a gas jet A proper pro portion of gas is mixed with air and when the burner is ignited it pro duces a hot flame without smoke

Kirchhoff—The Physicist

Kirchhoff was much younger than Bunsen when the two men met an started working together but he a clever scientist who had al done original work in mathe physics and electricity He

cated at the University in his native town, Konigsberg, and was a lecturer at Berlin for a time He next went to Breslau in 1850 as professor of physics He was then only 26, and when he was 30, he was appointed professor of physics at Heidelberg where he was to work with Bunsen and make his greatest contributions to science

Before the spectroscope and his development of spectroscopy with Bunsen Kirchhoff s most important work had been with electricity and it was he who had shown by experiments that an electric discharge or current in a wire travels with the speed of light

The invention of the spectroscope is linked with man s experiments with light its spectrum and his efforts to discover what light really is

Newton s early experiments with light and his theories as to its nature aroused the interest of scientists throughout the world

Spectrum of Light

As we all know, and as we have all seen for ourselves, when a beam of sunlight is made to pass through a prism of glass, the shaft of colorless light is at once turned into a pattern of colors—a "spectrum" from the Latin, meaning something seen

Newton in his experiments simply made a small round hole in the shutters of his window and the spectrum he obtained usually on the wall of his room was made up of overlapping colored circles of red yellow, green blue and violet light

One hundred years were to pass, however, before William [illegible] laston, an English chemist [illegible] the spectrum of light and ma[illegible] easier to study In 1802, he [illegible] formed a simple experiment [illegible] allowed the light to pass throu[illegible] narrow, vertical slit before it [illegible] the prism This made the spec[illegible] "purer" Instead of a series [illegible] lapping colored circles, [illegible] was now a long panel of l[illegible] which the colors did not [illegible] other

In time, scientists turned [illegible] the study of the sun's [illegible] the spectra given by other [illegible] of light As early as the 18th [illegible] chemists had shown that [illegible] salts of various metals are [illegible] in a colorless flame, they [illegible] flame The salts of sod[illegible] potassium, for instance, gav[illegible] low and a lavender color

In 1822, Sir John Hersc[illegible] famous English astronomer, [illegible] the colored light from such [illegible] through a glass prism and [illegible] that the spectrum was not a c[illegible] ous band of colors but was [illegible] made up of a series of brig[illegible] with dark spaces in between

For a long time Bunsen [illegible] alyzed substances in his lab[illegible] by vaporizing them in this w[illegible] found the method of great us[illegible] researches

One day in 1859, when [illegible] using this method, Kirchho[illegible] watching him Kirchhoff [illegible] that to tell the difference [illegible] flames that were almost [illegible] same color, Bunsen looked at [illegible] through pieces of colored g[illegible]





›bert von Bunsen 1811-1899

Gustav Kirchhoff 1824-1887

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heir writings the two scien escribed the instrument they veloped for their new field of h This device the spectro- is possibly one of the most ant and powerful tools of re that has ever been developed

Simple Instrument

first spectroscope was a sim strument It consisted of a wooden box which housed a glass prism At one end there was a small telescope and at the other a collimator or metal tube with a narrow vertical slit which was point ed at the flame of the burner in which substances were vaporized The light of the flame passed through the collimator and was con verted into a beam of parallel rays

The light then passed to the prism and the spectrum was enlarged and examined by means of the telescope

The two scientists soon found that each chemical element in the glow ing gas gave a bright line or lines which were easily recognizable The position of these bright spectral lines was definite corresponding to defi- nite wavelengths of light

As we know today, light is radi ated in waves of different lengths Each color in the visible spectrum corresponds to a different wa length The short violet rays "bent" by the prism to the grea

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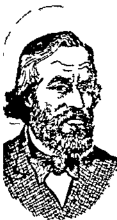
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As we know today, light is radiated in waves of different Each color in the visible corresponds to a different length The short violet rays ' bent" by the prism to the

and the long red waves to the least degree The spectrum of each element contains lines which, by their color or position in the spectrum, differ from the spectra lines of other elements

Bunsen and Kirchhoff were the first to make a systematic and scientific study of these spectra They showed that it was quite a simple matter to analyze a mixture of more than one metallic salt or chemical and were quick to see that "spectrum analysis was far more accurate and far more sensitive than any ordinary method of chemical analysis then known The two scientists proved that it was possible to detect 3 mil lionths of a milligram of a sodium salt

Bunsen used their new invention and methods purely for chemical analysis and the discovery of new elements but Kirchhoff turned to the mystery of the sun and the stars And for this research he has rightly been called the father of modern astrophysics

Fraunhofer Riddle

Kirchhoff solved one of the most puzzling mysteries of the day—the riddle of the "Fraunhofer lines"

In 1802, Wollaston had discovered seven faint black lines which crossed the spectrum of the sun and, in 1814, Joseph von Fraunhofer, a German optician systematically plotted and studied the positions of 576 of these lines But no one knew what they meant

The problem of these strange lines is an interesting one It was found that the light given candescent solids, and la dense gases, gave "continuou tra In other words, a solid iron or carbon if at white give a spectrum in which colors of the rainbow are Nondense gases such as heliu drogen and sodium vapor

bright line or "emission spe

Fraunhofer, himself, had that one of the dark lines sun's spectrum, occupied the relative position as a certain yellow line of glowing sodium

In 1859, the same year started their pioneering Kirchhoff was examining trum of sodium vapor He small piece of incande which is calcium oxide beh sodium flame and allowed th from both sources to pass t the prism Sodium, vaporize colorless flame, gives a brig spectrum and incandescent spectrum containing all the

Kirchhoff was startled to however, that the bright yell of sodium were now changed t lines—dark lines which were the same those which Frau had studied so carefully

It was perhaps one of the important experiments ever formed in a modern laboratory

Kirchhoff reasoned that this mean only one thing Sub the gaseous state blocked out sorbed light of the same color

ore wavelengths as that which themselves emitted Fraun dark lines were actually gaps sun s spectrum They merely he form of thin lines as this is age of the narrow rectifying hrough which the sunlight Similarly the br ght lines in t l ne spectra are only im f the slit

chhoff soon found that the thing happened to the bright f hydrogen and other glowing The bright lines of all were ed or reversed

y reasoned that it should be le matter then to note in the tory the bright line or lines distinguished any element and match them with their dark line counterparts in the sun s spectrum And this is what Kirchhoff d d Apart from sodium he thought it possible that other elements which are found on the earth would be found in the sun too

In 1859 and the following years he proved that the sun contains among other elements iron calcium magnesium copper zinc barium chromium and nickel Kirchhoff drew up a map of the sun s spectrum and this was published by the Berlin Academy in 1862

As Bunsen sa d they had now four d a startl ng new way of finding out of what the sun and the stars were made— with the same accu

box blackened inside holds two small telescopes B & C A sl tted p ed by h h yep ece of B The a fine loop of plat num nd C s F a hollow pr ruct g angle of 60 degrees f lled w th carbon d sulph de The es on a vert cal ax s both the prism and the m rror G used with cope to g ve an image of horizontal scale

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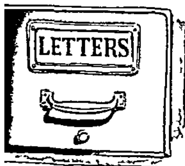
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ld's Depth Record

your March issue you state that ...epest des ...

...ut Walsh and Piccard this winter all depth records when their ...scaph Trieste dropped approximately seven miles in the Pacific Ocean ...e bottom of the Marianas Trench ... descent was made after the ...h issue of SCIENCE DIGEST had ...to press, and unfortunately it was ...ate for us to correct our item, ...h was correct at press time

—EDITOR

eology

...an avid caver and member of National Speleological Society, let ...hank you for reprinting Russell ...ee's article "Hole in the-Ground ...y" It nicely summarizes my re...o the question I m so frequently ...d—'What do you possibly get out crawling around underground?" ...up the good work which I have fully followed since my introduction to SCIENCE DIGEST two years ago

...OHN WATKINS FOSTER, PRESIDENT
U OF VIRGINIA GROTTO
NATIONAL SPELEOLOGICAL SOCIETY

Left-Handed Violinists

Sirs

In the article "Astounding Facts About Left Handedness" by Nino Lo Bello (April 1960) it is stated that a "lefty can't pursue certain livelihoods such as violin playing" This is not so The concertmaster of the local Tri-City Symphony is left-handed

My father who teaches violin to grade school pupils, says that left-handed students have an advantage since fingering which is done with the left hand is more difficult than bowing, which is done with the right Advanced playing requires skill in both hands and is just as difficult for a right handed person as it is for a left handed person

AMELIA C SMITH
MOLINE ILLINOIS

"Best There Is"

Sirs

I have been a steady reader of your fine magazine for the past 15 years I would like to say it was the best there was 15 years ago, and it is the best there is today

DENNIS MARTZ
LIVINGSTON MONTANA

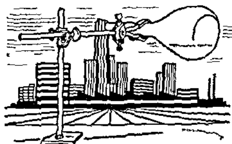
Tastes in Movies

Sirs

I wonder if John E Gibson's article "Your Taste in Movies Gives You Away" (March 1960) was just a bunch of boloney I believe it is not the type of movie that most people take into consideration when making their likes and dislikes, but the "making" of the picture itself—the story, the action the direction—the whole works When I go to see a movie, I don't give my comments before I buy the ticket

What then is my personality, Mr Gibson?

MARS G C
ANNAPOLIS ...



INVENTIONS PATENTS PROCESSES

Telephone Company Tests Memory System

Southwestern Bell Telephone Co will install telephone equipment with a memory on an experimental basis late this year

When a caller dials a number and gets a busy signal a memory unit is activated When the party hangs up both phones will ring The equipment also may be used to record messages for a person during his absence

Stripping Shovel Largest Mobile Land Machine

A mammoth stripping shovel the largest mobile land machine ever built has been purchased by Peabody Coal Co of St Louis It will be built by the Bucyrus Erie Co of South Milwaukee The huge shovel will be more than twice the size of any shovel now in operation

The shovel will have a dipper capacity of 115 cubic yards Its total weight will be about 14 million pounds and it will require over 12 000 horsepower to operate

It will take about two years to build and erect the shovel About 2̶0 road cars will be required to ship component parts to the mine site

The shovel boom will tower 21̶ in the air—as high as the deck of Golden Gate Bridge In 50 seconds machine will pick up 173 tons of terial dump it 464 feet away swing back for the next bite M removed by this machine in one could fill all the cars in a train ing from Pittsburgh to Chicago

The huge shovel will be con by a single operator located in conditioned cab five stories up senger elevator will provide ac the cab

The entire machine will be s by hydraulic cylinders one at the four crawler tracks Each dependently and automatically ated to keep the machine in position at all times

On the job the shovel will da cover more than twice its own in coal It will be used to remo earth which covers the coal se strip mines

Electronics To Speed Patent-Search Process

Streamlined patent searching electronic computer techniques is tested at the U S Patent Off Washington D C Patent Offic cials say it may accomplish in half an hour a job that formerly a skilled researcher up to a ful

The new system relies on rap culation by a general purpose elect computer that can process data turned out by a punched card mac The system is manufactured by Computer Division of Bendix Avi Corp

At the present time the comput being tested on a huge mass of p

covering chemical compounds that the basis for many commonly plastics

cording to Patent Commissioner rt C Watson the Patent Office ong felt that development of an nated searching system would pro industry and the public with a ible solution to keeping up with apidly growing number of patents ted each year He pointed out he Patent Office now issues more 1 000 patents each week

hway Train" ed by Army

highway train in which 12 or powered cars are coupled together the control of a single driver is investigated at the Stevens In e of Technology under a contract the Army Transportation Re h Command

signed for long hauls the train l travel on highways and other ces carrying up to 100 tons of at maximum speeds of 25 miles our A driver in the lead cab would ol speed and steering for all cars d the power in one of the units the disabled unit could either be ated or retained as part of the Once at its destination the train be separated and individual vehi

or surface and more efficient high-usage

re Food Item· en Concentrated Milk

iversity of Wisconsin dairy scien-have developed a method of pro-g frozen concentrated milk which ts indicate has taste appeal

The processing method duplicates many of the steps for sterilization of concentrated milk Raw milk is pas teurized homogenized and concentrat ed It is then packaged in cans and un dergoes another heat treatment After this the canned concentrate is cooled and frozen When stored at 10° F, the milk retains its flavor for at least 3½ months the university scientists said

Detailed Aerial Photos Taken at Night

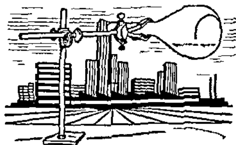
A detailed infrared photo of Man hattan was taken at 11 P M January 9 1958 from an altitude of 4 000 feet The system by which the photo was taken has recently been declassified by the Office of Security Revue Dept of Defense

Manufacturer of the system called Reconofax is HRB Singer Inc a sub sidiary of The Singer Manufacturing Co

Reconofax makes use of a scanning camera with an improved detector which is highly sensitive to infrared radiation Radiation—or heat—differ ences between objects are recorded on film by a recording lamp By utilizing a radio relay system the picture can also be developed almost simultane ously at a ground station

Since all objects on the ground in cluding military targets emit infrared radiations infrared provides an ideal means of producing night photographs An advantage of infrared is its ability to detect radiation which is not visible thus providing a possible means of camouflage detection

In the Manhattan picture areas of considerable industrial activity, such as the power plants scattered through out the city are easily distingu from areas of moderate activity dential and commercial—ard



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In the Manhattan picture, areas of considerable industrial activity, such as the power plants scattered throughout the city, are easily distinguished from areas of moderate activity—residential and commercial—and areas

slight activity such as Central Park

Reconofax s ability to resolve relatively small changes in temperature is seen in the clear definition of the roads and paths in Central Park

In the Hudson River the calm water beside a ship is easily distinguished from the agitated water in its wake A submarine s wake might thus be made visible

Reconofax may also have a number of nonmilitary applications For example it can be used in hazardous areas for obtaining weather oceanographic and topographic data Water temperature is said to be correlated with water depth The contours of a shore line can thus be determined from the air

Another application might be in medical electronics Since infections cause inflammation or heating of the skin the film will show bright spots where infection exists

' Side Man " Electronic Rhythm Maker

If your combo is short a drummer try S de Man

Side Man is an electronic rhythm producing device that can be operated without the use of tapes or records The device put out by the Wurlitzer Co can produce rhythm patterns for the waltz cha cha fox trot begu ne tango samba or rhumba

Used as accompaniment to a piano or other instruments the Side Man automatically produces the pre elected rhythm But for the individual who prefers to create h s own rhythms there is a push button panel so that Side Man can be manipulated to the user s l king

Make Colored Motion Picture From Black and White Film

Technicolor Corp of Hollywo been assigned the patent righ method of making colored motio ture film from a black and whit inal

The method involves project image of the original on a sheet terial suitable for coloring The is then appropriately colored a tographed on color film with the chrome original in contact w sensitive film The resulting picture film thus contains bot and detail

Apartment House Guarded by Television

Tenants in a New York luxu ment building are being obser closed c rcuit television screen ride an automatic elevator to their floors

A small television camera on top of the car relays a co image of the car and its occu a lobby screen that is watched doorman The system was inst offer tenants greater protectio

A television console in the lo two screens One shows the int the car the other monitors a entrance in the basement The d can talk over a two way rad persons at both sites

The security system is one first of its kind according to Sugar president of Bell Tel Inc the designer

Bird Feeder Feeds Little Birds Only

A patent was issued on a bird that feeds little birds but not big It shuts its door in the face of thing as bulky as a bluejay

inventor is Wilhelm E Poulsen
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feeder has glass sides and rests
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swings in the wind so that the
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and help itself to seeds from a

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he perch dips and pulls down
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tarter Comes in Tube

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le Flame is semisolid It looks
bright red jelly but will not stick
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the size of a golf ball under
oil or wood and light it This
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Flame from burning the manu
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on water This makes it useful
hunters fishermen and campers
rainsoaked ground or wood will
top it from burning

Slip Proof Bathtub

A new product provides a simple yet effective method of slip-proofing a bathtub The product called Don t Slip consists of 12 adhesive strips about an inch wide and of different lengths so that they may be laid out in a decorative pattern

The surface of the strips is a synthetic rubber A small roller is provided to eliminate air bubbles after the strips are placed in the tub

Thermometer Tie Clasp

A tie clasp with a built in circular thermometer is being offered by Zinn Originals The thermometer has an easy to read dial and is calibrated from minus 20 to 120° F It is sensitive to within one degree The same thermometer is also available in cuff links

Magnetic Storm Door

An aluminum storm screen door that closes itself magnetically has been announced by Weather Seal Inc The door uses a Koroseal vinyl plastic magnetic strip recently developed by B F Goodrich

According to Goodrich this application is the first use of the flexible magnet in the home field It was developed for and is widely used as an airtight seal for refrigerators and freezers Permanency of the plastic magnet is claimed to be superior to that of most conventional types

ADDRESSES

S de Men Wurlitzer Co De Kalb Ill *Fire Sta ter* National Distr butors Inc, 204 Market, Wichita Kan *Slip-Proof Ba* Don t Slip Inc. 340 W Lincoln Ave Vernon, N Y *Thermometer Tie Clasp* Originals 321A Greenwich St New York N Y *Magnetic Storm Door* Inc Barberton Ohio

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End table size the Side Man is completely self contained with three speakers and amplifiers The instrumental sounds are made by oscillating tubes

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SCIENCE DIGEST

January through June, 1960

Titles listed in italics are usually less than a full page in length. BC indicates Back Cover, IBC, Inside Back Cover, IFC Inside Front Cover





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SCIENCE DIGEST

JULY

Twenty-fourth year of publication

Original cover painting, 'Atomic Image Number 11,' by George V. I

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THE ATOM'S POISONOUS GARBAGE

by Walter Schneir

Condensed from The Reporter

Compared with all other pollutants radio active waste is millions of times more toxic

BASIC FACT of life in the atomic era is that you cannot use the fissioning atom for war or e without producing va t quan s of lethal radioactive wastes ver the past 15 years while one of the Atomic Energy Commis has been conducting bomb tests ading fallout globally another has been transporting precisely same kind of radioactive ma l to isolated areas and warily mbing it in underground steel l reinforced rete tanks he only real ference be n radioactive out and wastes at the former own high the strato re by an un trolled nucle with subsequent rse deter ed by the va ies of wind rain whereas radioactive wastes the by product of a carefully trolled nuclear reaction and their mate disposal is up to man

Not all of the atomic wastes are ied some of the less radioactive terial is released into rivers or nped into the sea by the AEC and licensees It is this form of dis al that has provoked much of recent controversy

Although the controversy over disposal of radioactive wa tes been going on for some time it was heightened in the spring of 1959 when the National Academy of Sci ences released a report Radio-active Waste Disposal into Atlantic and Gulf Coastal Waters prepared at the AEC s request suggesting 28 tentative sites for offshore dumping of low level radioactive wastes The anguished howls from chambers of commerce citizens groups state conservation departments fishing and recreation interests and many congressmen are still ringing in the AEC s ears

The essence of the AEC s dis posal problem lies in the nature of the waste it self compared with all other in dustrial pollu tants radioactive waste is millions of times more toxic undetect able by human senses and abso-lutely ineradica ble except by a process of natural decay that may take centuries

Clearly this is the most hazardous and treacherous material man has ever tried to deal with The danger of accidents was dramatically illus trated last November 20 by a minor explosion at the Oak Ridge National Laboratory in a room where highly radioactive wastes are processed to recover plutonium

The explosion destroyed $10 000 worth of e scattered one fiftieth of an

plutonium over a few acres For the following three months, cleanup crews tracked down the minute quantity of plutonium, they painted buildings, tarred roofs, replaced asphalt roadways, removed and resodded grass, and destroyed several trucks

Physicians examined 250 employees and found that nine had absorbed some plutonium internally By February 15 the job was nearly but not altogether finished Total cost to decontaminate a $10 000 explosion between $250 000 and $350 000

This three month cleanup task was made necessary by a little more than half a curie of plutonium waste A curie is the basic unit of radioactivity Physically it is a very tiny fraction of an ounce of material, from the standpoint of human health it can be an enormous amount of radioactivity

In the pre atomic bomb world of 1940, only a few thousand curies of radioactive material (mostly radium) were available in the entire world Today our weapon manufacturing program (not counting testing), plus our peacetime reactor program, is producing billions of curies of liquid, solid, and gaseous wastes every year

The huge steel tanks interred at five different locations (primarily at Hanford, Washington) in the United States contain more than 65 million gallons of high level radioactive waste Within the boiling hot caldrons is enough radioactive ma- to cause severe pollution of all the land and water area of the United States The tanks them- may last for another ten to 50 yea- their contents will be deadly to for many centuries

The Reporter (Mar 17 60) © 1960 by The porter 660 Madison Avenue New York 21 N Y

THE WASTES can probably be cessfully transferred to tanks, but no one regards tank s age as a long term answer to problem The hope is that permanent means of disposal eventually be developed One gestion is to pump high level li wastes into deep, mined-out salt deposits

Possible hazards from this t nique however, include the tamination of waters that surface streams and the form of radioactive geysers as a resu the heat generated by the w

Two approaches are at p available for the disposal of r active wastes concentrate and tain or dilute and disperse The will continue to concentrate and tain the hottest wastes Only level wastes are released into th vironment For this reason r people believe that low level w constitute the greatest present he hazard

Low level wastes generally tain from a few millionths to thousandths of a curie per gal some, loosely classified as 'ir mediate,' may be as "hot" as a curies per gallon

The low level wastes are prod in enormous quantities accord

e AEC, any plan to concentrate contain any considerable frac- of them would be impracticable extremely costly

ie Columbia, the Mohawk, and other rivers are currently be- used to dispose of low level es, within a few months the ion will be used for such dis Other low level liquid wastes red directly into the ground s and solidified liquids are times placed in concrete lined llon barrels and dumped at gaseous wastes are released to tmosphere



ie disposal of these wastes is ully guided by maximum per- ible levels for human exposure

..., ... question is ently asked Is the so called ximum permissible level" of ition a completely safe level? answer is "No" It is impossible ve a completely safe level of ion, "permissible" levels must efore be chosen in an essentially trary fashion by a balance of ical, economic, and scientific ors

he trouble with the dilute-and erse theory is that low level tes released into the water do dilute in any co ... predict- able way For example, many or- ganisms concentrate radioactive ele ments in their bodies by factors many times the quantity of radio activity in the water

A few years ago, scientist Louis A Krumholz conducted a three year study for the AEC and TVA to determine if partially purified liquid waste discharged by Oak Ridge into White Oak Lake had any effects on life in the lake

Doctor Krumholz reported that the fish in the lake grew more slowly and died younger than was normal for the species Large quantities of strontium 90 had been absorbed into the bone structure of bluegills and black crappies in concentrations 20 000 to 30 000 times those found in the lake itself

One species the white crappie, relatively common in the lake when the study began had died out, an- other, the redhorse, had nearly dis appeared—only 50 were found all three or four years old

Incidents such as this have been cited in the current controversy over ocean and offshore dumping as rea sons for an extreme degree of cau- tion The *Wall Street Journal* re- cently quoted Dr Paul C Aebersold, an AEC official in rebuttal "Under- water disposal is absolutely safe when it's properly executed"

Reporting an international ... ference on the subject of radi wastes, the *London* ... ence correspondent John ed "It is not within the reference of the ... resolutions on ...

if it had been, it is quite likely that a resolution would have been passed today urging that radioactive waste disposal at sea should be banned"

Huge gaps remain in our knowledge of the seas We still are very far from knowing all there is to learn about the ocean's currents or the mixing rates of the deepest layers of the water with the surface Not long ago many oceanographers felt that the deepest waters might not mix with surface water for 2,000 years now they are not sure

We do know that the ocean like rivers and lakes is not a simple dilution tank microscopic organisms plankton and shellfish concentrate radioactivity by many thousands or even millions of times the level in the surrounding water Fish range freely between deep ocean and continental shelf Shrimp squid and other organisms help spread radio active elements from the depths to the surface

The natural radioactivity of the oceans is much less than that of the land Soon man will have the power to increase this radioactivity just about indefinitely What would be the effects of such a change on the life in the sea and on human beings who depend on the sea for billions of pounds of protein each year? Frankly, no one knows

WITH THIS UNCERTAINTY as background U S Bureau of Standards Handbook 58, issued in 1954, gives this advice regarding radioactive wastes "Disposal shall be in regions, where water depths exceed 1 000 fathoms

"In the case of sea the act is final if disposal at is carried out under conditions that later appear to have been advised, or dangerous, there is way of correcting the situation"

of Sciences which ... panel is of the opinion that ... Atlantic and Gulf of Mexico ...



Of the 28 tentative dumpsit... gested by the NAS, some ... little as three miles from sh... water 40 or 50 feet deep A... Cod, where commercial fish... the bathing beaches are ... the local economy, a protest co... tee was formed Its researc... closed that unknown to loca... dents and contrary to the w... in Handbook 58, offshore du... had been going on for years Crossroads Marine Disposal ... poration of Boston had been ... ing radioactive wastes in 50 f... of water in Massachusetts Bay 1946 and on an AEC license 1952

The AEC has since amende... license of this company so ... prohibit dumping in less

fathoms Texas Representa
Clark W Thompson has pro
l a bill calling for disposal of
s at least 200 miles from shore
lter over 1 000 fathoms deep,
n leakproof containers
is last point is important inas
as the AEC does not require
barrels be so constructed as not
ak open at 1 000 fathoms Nor
anyone know how many barrels
ed into the sea spill their radio-
contents on the way down
those which reach the ocean
safely are expected to corrode
n 10 years
any conflict between cost and
tion the AEC finds itself
embarrassing position it con
and encourages operations
produce radioactive waste then
regulate itself and its li
es to insure that the waste dis
does not harm the public
case in point is the pollution of
Animas River in Colorado and
Mexico where the water used
000 people was found by the
c Health Service to contain
m far in excess of maximum
issible levels
ie radium in the Animas River
s from a uranium refinery run
he Vanadium Corporation of
rica For more than ten years
company had been pouring
es into the river without regu
Colorado and New Mexico
ned that the AEC was super
g the process the AEC insists
it had no regulatory authority
a score or more of uranium mills
1957

TO MANY of the foregoing criti cisms AEC spokesmen reply that the critics are misinformed or just don t understand These spokes men note that the AEC has no pres ent plans for ocean dumping of high level wastes which are the only wastes that could substantially alter the radioactivity of the oceans

When the Atomic Energy Act of 1954 was passed the very existence of radioactive waste was largely un known to the public This ignorance prevailed until 1956 or later

An apparent slowing down of re actor development may provide an opportunity for Congress to recon sider the path we chose to take in 1954 Most of the present reactors in the United States are owned by the military or the AEC—the era of commercial power reactors is just beginning We can still take a ra tional approach carefully balancing social gains against social losses in stead of treating atomic power al most mystically as the inevitable wave of the future

On the side of gains would cer tainly be the AEC s isotope pro gram which provides invaluable re search aids to medicine industry, and agriculture But is the produc tion of atomic power to be counted a gain when fossil fuels are far cheaper and still abundant? Is the construc tion of more and more atomic sh with their potential for mass dis a gain? Perhaps the "Yes" But shouldn t we at the question?

For example some dict 300 fission powered

1975, dumping over a million curies of waste into the sea each year Nuclear submarines and icebreakers have great and obvious advantages but is it worthwhile to build mer chant and passenger ships with atomic reactors? If the *Andrea Doria* had been nuclear powered, *millions of curies of radioactivity would have been released in the sea* close to Nantucket and very likely *all* the passengers would have been killed To judge the effects on beaches and fish we need only re call *what* our Bikini tests did to Japanese tuna

Certainly any careful weighing of the pros and cons of nuclear power will have to consider the rec ommendations on Somatic Radia tion Dose for the *General Popula tion* released by *the National* Committee on Radiation Protection and Measurements Here is one of the report s conclusions

we believe that the popula tion permissible somatic dose from man made radiations *excluding* medical and dental sources should not be larger than that due to na tural background radiation without a careful examination of the reasons for and the expected benefits to society from a larger dose

The burden of this conclusion is that the maximum permissible dose for fallout atomic waste and all *other man made* radiation excluding medical X rays *should* be no more than one tenth of a roentgen annu ally *or a total* of three roentgens for 30 years Whether it will be possible to develop nuclear power on a large scale and still meet such ... is a question yet to be faced

ONE MAJOR ... make all our radioactive wastes academic ... of the world s leading ph... lieve that man s ultima... power will be atomic fusion ... than fission There is a strong ... sibility that the power of a th... nuclear reaction (such as is ... in the hydrogen bomb) ... tamed and harnessed

Happily fusion power would ... duce no atomic wastes and ... practical purposes would be ... *haustible*

Using the facts that are a... to us today we might do well ... a few last questions before ... irretrievably to set full sa... uncharted course

Just how essential is a lar... fission reactor program to e... to meet our power needs ... next few decades?

When do we actually expe... faced with shortages of *foss...*

Do we need some separate *regulatory* agency, other th... *AEC to protect the public from* radiation hazards o... atomic waste and fallout?

Our answers to these and ... questions will be better reas... we can free ourselves from the ... istic notion that a complete c... over to fission power is inev... *It is* not too late at this point to reconsider old decisions and ... new ones For the moment at ... a choice is available



By Murray T Pringle

: all started when Enghausen a *Tribune* story about the long week of today s young mother hausen had his own opinions it that and he promptly ex a them in a letter to the or Among other things he stated any woman who puts in that hours is awfully slow a poor geteer of time or just plain in ient The 36 year old bachelor lu led his letter by offering to over the reins of any household show the housewife how it ld be done

cores of irate housewives wrote ccepting the challenge just dar Enghau en to prove it The ui selected t of Mrs Robert Dalton and arranged for him to assume command for three days

If Minneapolis housewives had expected their critic to chicken out they were disappointed Armed with nothing but his theories and more courage than the law allows he moved into the Dalton home The Daltons incidentally had been the subject of the original news story that had inspired Enghausen s letter

I want you to understand he told Mr and Mrs Dalton that you are to take it easy From now on the housework and children are my responsibility

Mrs Dalton smiled and sat back with an interested show me pression on her face At t the three day period was no longer in a I sourı frame of

I never saw sa d Within thorou hly

our house, and he seemed to know just where everything was — the soup in the basement and the pliers on the rear of the refrigerator top "

Mrs Dalton was unstinting in her praise 'He was certainly methodical The only thing he forgot was to wind his watch He certainly fit beautifully into our family What a marvelous valet he would make! In cooking he did better than I As for cleaning I am more thorough but perhaps that is unnecessary In summing up she described the bachelor housekeeper s stay as wonderful adding Even the kids were sorry to see him go

Here is a partial rundown on what Enghausen did the first day

Cleaned the first floor

Washed three loads of clothes and hung them outdoors to dry

Ironed all the laundry including underwear and sheets

Fixed a soup and sandwich lunch and a big supper which he served in the backyard

Baked two cakes neither from a commercial mix

Prepared two salads for the next day

Bathed Marty, 6, Mary, 3, and Robbie, 2, simultaneously (Timmie, 7, escaped when he heard water running)

Washed woodwork

EXHAUSTED, ladies? Enghausen wasn't He proved it by tackling more chores

Undressed the children for their nap redressing them when they awakened

Borrowed soda for the cak- baked from a neighbor whom described thusly 'She looked though she thought she had humor me"

Disciplined the children

Scrubbed the kitchen floo p m because 'I don t bel putting things off" All this wa complished during his first day the job!



The children loved him Upon departure seven year old Ti gave him a going away gift of pennies Three year old climbed onto his lap and told I love you And two ye

Interviewed at the end of three day trial Enghausen chi victoriously I still wish, he "that teaching 115 students w easy as handling four children house"

Enghausen figured his work totaled 20 hours for the three Asked to what he attributed hi markable efficiency, the bespect bachelor pointed out that he kept house for himself for years and did housework to money while a college senior

"I still maintain' he concl "that housework is not the in nable chore that women claim it Those who claim so are inefficie

ecent scientific studies have .ed up Enghausen s conclusions ne motion study which recorded analyzed every movement made . group of housewives concluded most of the energy expended in ework is superfluous The re s of this study, according to the nal, *Medical Times*, points to a ative factor in diseases such as ritis which often begins in the :

ll adapted kitchens lack of ined work methods and poor ngement of equipment were ned for American housewives' avagant expenditure of energy average of 500 steps a dozen s and starts and 40 to 50 reach movements were involved in

ion at Wayne University in De t revealed that many accepted cedures followed by most house es were actually wrong The dies disclosed that women were king more than twice as hard as y should because

1 They don t arrange household uipment properly

2 They don t plan working meth s carefully

3 They squander energy through sted motion and unneeded steps

4 They are victims of habit and idition

Now what about you? Do you nt to waste your time and energy would you rather enjoy untired isure hours with your family? ere are a number of work easing, time saving rules of hou ehold be havior which scientific studies have shown will slash household drudgery

FIRST avoid reaching up and stooping In nine homes out of ten pots and pans are stored in kitchen cabinets at floor level The Wayne University tests revealed that almost 20 times more energy is expended by stooping to pick up an object near floor level than in tak ing it from an upright, flat footed position

Avoid this needless drain on en ergy by rearranging supplies and equipment so they can be used with out stoop squat and stretch

Here s a pleasant bit of advice *Sit whenever possible* Amazingly, the average American housewife re sists sitting down on the job Yet it has been found that exactly half the energy is needed to do a job sitting down as standing So if the job—be it ironing dish washing potato peel ing batter mixing—can be done sit ting down sit! But sit properly, well back on the chair trunk in a straight line feet flat on the floor

Are you ambidexterous? You should be—or at least try to be ac cording to Dr Lillian Gilbreth one of the foremost authorities on bio mechanics considerable time and energy can be saved by learning to use both hands effectively Whether or not you realize it one hands does more work not be put those " work, too

Develop smooth ments Rhythm

exclusive property of the ballet dancer or golfer Rhythm is an important attribute in any type of repetitive work.

Says Dr Gilbreth "Anyone who is motion minded subconsciously follows a pattern Each time she repeats a job her hands move in the same curve and with the same rhythm A ballet dancer, golfer, in fact any expert does his job with grace, rhythm and economy of motion"

Do you abhor bed making? Well, it can't be avoided but here too you may be making unnecessary work for yourself Lots of women do A study of bed making at the University of Vermont Agricultural Experiment Station disclosed that women trot endlessly back and forth while performing this chore One lady traveled 262 feet another 188 feet

THERE IS a right (easy) and a wrong (tiring) method of bed making Compare the following with your present system

Place everything you ll need on a chair at the right side of the bed—sheets blankets pillows bedspread Stand at the bedside and throw the bottom sheet across the mattress Follow with top sheet blanket and spread (So far, you haven t moved a step) Now start walking around the bed tucking in the bottom sheet first then the top sheet and blankets Smooth the spread as you go The entire operation shouldn t take more than one or at most two round trips See how easy it is?

Proper storage is important to an efficiently run household Wh and wherever possible keep equipment and food at the first usage If an item is with heat store it on or near stove This would include as pot holders, lids of pots pla seasoning, can openers and goods



Marshal your equipment b tackling any job One housewif volunteered herself and her l making methods for scientific really did things the hard wa was noted as this lady vacu her living room that she ke cleaner attachments scatter various places about the hous actual count she made a t 15 trips — wholly unnecessar round up needed parts each ti cleaned the room

She was advised to use a c tray to carry these attach eliminating the need to retur stantly to a drawer or closet the housewife acted upon th vice her cleaning time was sli half

On the subject of biomech Dr Gilbreth suggests 'Tak fullest advantage of momentum gravity in your work' The d goes on to explain that in c such as ironing, the weight of tool should do part of the work hand merely guiding it Dr breth further suggests placing

lder heavy furniture that must
ntly be moved
lly, beware of psychological
Dr William Sherman writ
The Journal of The Student
l Association offers the fol
tips for combating it
ld clutter as much as possible
completion of a chore put
and clean up
ld glare Metal surfaces and
re insidious and subtle sources
re which rebounds into the

ld tiring colors White is espe
tiring So to a somewhat lesser degree, are purple brown orange as well as the harsher shades of blue Most restful colors in the spectrum are medium shades of green and yellow

WELL THERE IT IS ladies Why not try putting some or all of the above into effect at your house? Its to your benefit Besides you dont want a mere bachelor like Maurice Enghausen showing you how it should be done Just remember that many American housewives really are poor housekeepers Dont be one of them!

Glassy Shapes Are Not from Space?

TES—MYSTERIOUS glassy objects
believed to have come from
pace—are probably native to the
The glistening shapes which re
buttons spheres bowls and
appear to have no relationship
geological formations in which
re found

lence to back up this conclusion
their origin was presented by an
can chemist and a German phys

mical analysis of the tektites
they contain only 5 to 10 percent
ich nickel as do glassy materials
to come from meteors accord
Dr William D Ehmann of the
rsity of Kentucky

he low nickel content and nickel
ratio found for tektites do not
ly eliminate the possibility of
formation by meteorite impact
Dr Ehmann However on the
of comparison to known impact
s their formation by meteor im-
either terrestrial or extraterres
appears to be unlikely'

Measurement of the ages of tektites from various parts of the world by a radioactive technique has led Dr J Zahringer research assistant at the Max Planck Institute in Heidelberg Germany to much the same conclusion he said

One theory has been that tektites originated as the result of the impact of meteors with the moon Dr Zahringer indicated But measurements made by a potassium argon dating system show that all samples of tektites from the South China Australia region are about 600 000 years old those from Czechoslovakia are 9 million years old and those from Texas and Georgia are 30 million years old

It is an interesting observation that these ages all agree with the ages of the geologic formations in which the te
tites occur the German scientist
This suggests the hypothesis that
tektites are of terrestrial
they fell to earth shortly after
were formed or else were
earth by huge impacts of

Tunnel Diodes Promise To Perform Many Jobs Better, Faster

pinhead marvel of electronics

by Stanley W Penn

Condensed from Wall Street Journal

THE TINY TRANSISTOR current l ing of the electronics world eventually may be deposed by an even smaller device known as a tunnel diode

The newcomer performs some of the same jobs as a transistor and does many of them better faster and cheaper The tunnel diode will have a wide range of applications in defense in industry and in the home It is not likely to replace the transistor in all applications but it will supplant the older device in many areas and supplement it in still others scientists believe Furthermore because the tunnel diode can be used in a number of places where the transistor cannot the new device also poses an additional threat to the older vacuum tube

The new development promises among other things faster cheaper electronic business machines improved television reception in rural areas and better and more compact communications systems for space vehicles

T a ... eet Journal (Mar 18, 60) © 1960 by the Wall S eet Journal Dow J nes & Company In 44 Broad S eet New York N Y

All major U S makers of ... sistors and other sem ... developing tunnel diodes ... ductors are materials ... electricity less efficiently ... conductors as copper but ... ter than materials classed as in... tors Semiconductors can e the... plify or control electrical imp...

to be swift Indeed little ... two years ago the tunnel diod... unknown in this country I... was discussed in the U S in ... ary 1958 in *Physical Rev...* technical journal by 34 y... Leo Esaki a Japanese physici...

At first Dr Esaki s article ... caused a stir Then a few elec... companies began to grasp t... mendous potential of his dev... tunnel diode which is only a... size of a pinhead is now r... General Electric Co to be u... times faster than the trans... some uses Also it can be 1 ... of the size of a transistor th... dles comparable functions ... as little as 1 percent of the ...

... at on and thus pr... someday to be easier and chea... mass produce Unlike the tran... the tunnel diode can perfor... ciently at extreme temperatur... in communications devices at high frequencies

Despite its many adv... there are some drawbacks to...

ıs diode It ıs essentıally a low
r high frequency device and
ot perform so efficiently in elec
:s systems requiring a great
of power such as television
mitters or in products operat
t low frequencies such as AM
and phonographs Here the
istor likely will be superior
iterially and functionally the
:l diode is not so dissimilar to
ransistor as the differences in
icteristics of the two devices
t indicate Both amplify sig
and/or control electrical im
s Both can consist of the semi
ictor metallic elements silicon

u oues)
ie differences between the tran
: and the diode arise mainly in
imount and nature of foreign
er that is introduced into the
conductor material Fifty to 100
s as much foreign substance
d alloys goes into the tunnel
e as into the transistor These
irities form a very thin barrier
ie tunnel device through which
rons ' tunnel at the speed of

ı one of the first applications
ie tunnel diode in the U S , Res
Engineering Corp of Pasadena
fornia is using G E 's version of
device in a missile to amplify sig
the missile sends out while in
it Resdel expects the system
itually to cost about one fourth
much as the conventional two
ium tube system it replaces

The new Resdel amplifier weighs one and a half ounces, compared with 25 ounces for the comparable tube amplifier The diode amplifier occupies 1 9 cubic inches and uses only 50 millionths of one watt of power whereas the tube amplifier occupies 18 cubic inches and con sumes five watts By conserving space and power the diode should find many uses in military and space equipment where such features are vital

Sony Corp the big Japanese elec tronics company, plans immediate marketing of its tunnel diodes in the United States Dr Esaki was a re searcher for Sony when he devel oped his device Sony says it has applied for a U S patent on the tun nel diode

Industry executives agree the tun nel diode will find its wav into data processing systems and other equip ment much faster than the transistor which was first successfully put to gether by Bell Telephone Labora tories technicians in 1948 but was not offered in an international Busi ness Machines Corp commercial computer until 1955 →

the tunnel diode



A tunnel d ode can fı comfortably

Scientists had to learn a new tech nology in developing the transistor but this knowledge is being put to good use with the new diode

Economics of course is another important consideration Dr W R Sittner division manager of Sperry Semiconductor division of Sperry Rand Corp says flatly that tunnel diodes will lead to the manufac ture of smaller less costly comput ers Major initial applications he suggests probably will be in high speed computers for the military then as volume increases and costs are reduced it probably will become 'a strong competitor to transistors for computing functions and logic circuitry in electronic business ma chines

ALREADY TUNNEL DIODE prices have dropped sharply When G E first made samples available last September they sold for $75 each New ones came off a G E pilot production line recently priced as low as $10 And it is predicted the tunnel diode eventually will be cheaper than its transistor counter part The average price of tran sistors used in computers is $2 each for those made of germanium and $10 for those of silicon which with stand higher temperatures than ger manium Simpler transistors used in radios and other entertainment prod ucts sell for much less

Doctor Alan M Glover vice presi dent and general manager of the Semiconductor and Materials divi sion of Radio Corp of America as serts that tunnel diodes will be ex

> The human mind is often so ward and ill regulated in career of invention that it is first incredible that any covery should be made and it has been made, it appears credible that it should have long escaped men's research
> —Francis

cellent for eath satellites where th size of equipment and power supp is critical He explains that s the devices operate on little pow the weight and size of battery su plies can be cut drastically

Tunnel diodes also permit m compact packing of circuits beca they give off less heat This me not as much air is needed betw the diodes to carry off heat as is quired with a transistor The tr sistor in turn was a notable provement over vacuum tubes wl give off even more heat

The diodes promise better TV ception in suburban and rural ar The diodes mounted directly c TV antenna and powered simply a flashlight battery can be usec amplify a TV signal without incr ing noise and static to the same tent that many conventional am fiers do according to William Sich of International Telephone and Te graph Corp

Bell Laboratories researche Marion E Hines and William Anderson have developed a tunn diode amplifier that increases th strength of radio signals in the m crowave range over 1 000 me cycles The transistor cannot b

here because of the high fre ies and the diode is signifi ' smaller cheaper and lighter ,acuum tubes which are used itly

particular importance is the bat tunnel diodes are believed perform transistors under ex temperatures A diode made con will perform at up to 650° nheit compared with a limit of F for a silicon transistor The l diode works well at the tem ire of liquid helium which is a few degrees above absolute —460° F A silicon transistor mparison ranges down only to ' F

entists believe the tunnel diode l suited in the growing field of enics — the study and use of cold temperatures — making le the design of equipment now is impractical (See *Cold About Cryogenics* p 35 — For example cryotrons elec : switching devices that incor e temperatures close to abso zero in their operations even ' could be used as fast acting uter components They need all amplifying device to work them—a job the tunnel diode , could fill

one unusual experiment the l diode was used to measure stra n in a dog The diode was d near the dog s heart and the of the heart provided enough y to activate the diode The gth of the signal the diode sent raried with the strains the dog subjected to R C A s Dr Glover believes tunnel diodes will be used to measure strains in animals in space travel before man goes into space

THE TUNNEL DIODE also is less sensitive to radiation effects than the transistor Hugh Lowry man ager of applications engineering in G E s semiconductor products de partment suggests the Esaki devices could be used in nuclear controls that operate close to radioactive ma terials such as those in a nuclear reactor

• • •

The tunnel diode possibly is the most advanced of a number of im portant developments within the last few years in the fast moving elec tronics field Still several years away from commercial applications is the molecular electronic or molectronic concept which aims to replace many different electronic components with a single minuscule sliver of crystal

A significant advantage of the molectronic device is that it sharply reduces the number of connections and soldering points needed in an electronic system An executive of an electronics company which is hard at work on both tunnel diodes and molectronics believes the latter is an interesting promising new concept whose general applications are several years away

The tunnel diode he adds fills ' crying need now for a semico ductor device that can operate high frequencies and also impro many ways on the transistor the u e of either is possible


The Bettmann A

Fashions in cooling change, and so do answers to the quest

How to Beat the Summer's Heat

By Joseph D Wassersug, M D.

WHEN THE AMBULANCE brought him to the accident room of the hospital, his temperature was 104 2 degrees Fahrenheit and his skin was hot, dry and parched. He was a young man, a college student, and this had been his first day working with a road construction gang. The day had been a hot and muggy one. The temperature had topped 96° by early afternoon and the humidity was close to 90 percent.

Another road worker filled in the rest of the story. "The fellow was doing well," he said, "working along with the rest of the crew till late afternoon He had been sweati lot but, about 3 o'clock, he w sweating any more, and he sta to complain of a terrible heada Within 20 or 30 minutes, he half-conscious Some of the moved him into the shade of a tr and let him lie there until the bulance came"

The doctors diagnosed the cas *heat stroke* and at once set abou reduce the student's temperature normal Two male nurses immer the heat victim in a tub of c water while, at the same time massaged his limbs and trunk to

the circulation to his skin In 45 minutes the lad s tempera 'as down to 103° He was then out of the bath and attend ipplied cold sponges A cool heet was placed over the pa body and a fan was placed at ot of his bed to speed evapora ad cooling

young man was watched care for signs of shock or conges But in a few hours his tempera vas down to 99° and he was more comfortable The doc nevertheless decided to keep ospitalized a few days until ould be sure his temperature remain normal On discharge ollege student was cautioned t vigorous work on hot days se he could have a heat stroke

case just cited illustrates how (or *almost* deadly) the ef f strong sunl ght and heat can the human body Still this er there will be hundreds of r victims of *heat stroke* and nds of milder cases of *heat it on* and *heat cramps* unless precautions are taken Hos cc dent rooms and wards also ave their usual quota of cases ere *sunburn* Yet practically us can avoid trouble on hot y following a few s mple rules on an understanding of the roblem

of us know that environmental s derived from the sun which s earth air and man but the m is not as simple as it might eem

Heating of the earth by the sun depends on a number of factors in cluding air currents clouds and humidity Days that are gusty or windy for example seem cooler than days when the air is still The cloudiness of the day also is impor tant because of the clouds ability to absorb some of the sun s heat

It s the Humidity?

Humidity plays a crucial role not because it regulates environmental temperature but because it can in terfere with the normal cooling proc ess of the body Whether the day is hot or cold does not depend on temperature alone

Internal heat or body heat is or dinarily constant and is normally around 98 6° F However body heat has to be d ssipated or the body would burn up from its own heat producing mechanism

Body heat is ordinarily lost by *radiation condi ction evaporation* and *convection*

Radiation is the transfer of en ergy between bodies by electromag net c waves The flow of these waves is from the warmer to the cooler Your body rad ates its heat outward but it can only do so when the temperature of the environment is lower than that of your body When environmental temperature rises beyond 98 6° loss of body heat by rad ation is impossible is one reason why hot days so deadly

A second method by w body loses heat is through *tion* or the ' flow of heat

substance from one molecule to an other" It varies with the nature of the material and its transfer from one object to another is influenced by the temperature difference, the surface and contact In other words, sitting on a large block of ice will conduct more heat away from your body than sitting on a small ice cube or a large block of wood If you get into a cool tub of water heat will be conducted away from your body through practically as large a sur face area as possible

Evaporation of sweat is another method by which your body gets rid *of its own heat* In physical terms a liquid (sweat) is transformed into a gas by sweating and since it takes heat or energy to bring about this transformation the skin is cooled

Body heat is *generated by the* body s ability to burn food through various oxidative processes The heat of the body can be increased by conduction and radiation into the body from external sources or it can be lost by evaporation radiation conduction and convection To keep cool you must take advantage of this knowledge

Two Ways to Beat Heat

Basically then there are two ways of beating the heat *One Alter the environment Two Alter the per son* Let s consider the latter first Production of body heat never ceases until death but the rate of heat production may be increased or re duced For example, exercise in creases your production of body heat So *does* a heavy meal Here, then, we have one clue for the heat Whenever possible strenuous work or physical and avoid heavy meals Salt t are helpful when sweating is sive

Body heat is lost in the ing environment through rad and conduction but when air perature is higher than skin perature heat can be lost onl evaporation of sweat This is a entific fact, and it provides us another clue for avoiding hea haustion or heat stroke

On a hot day, everything sh be done to encourage evaporatio moisture from the skin Clo should be light and loose-fittin use of fans or other devices to c late air also aids evaporation T fitting clothes or nonporous cl do not permit free circulati air

Manipulation of the enviro is a good way to beat the heat ever such manipulation is po This can be accomplished in two ways Either (1) Go cool—to the beach or park or or even into the cellar of your home or (2) Have a *cool* en ment brought to you in the f air conditioners fans or ev plastic bag filled with *ice chips* ing on your head

A simple convenient and inex sive method for cooling off is to two face cloths in cold water *them* dry place them in plastic put in refrigerator and when pr erly chilled place one of them your feverish brow while the

mains cold. When the one on
ıead gets warm, you can put
ne ınto the refrigerator and
ut the second one that s been
g there In this way, by alter
; back and forth, you have a
comfortable forehead at least
ourse ıf you are fortunate
h to live ın an air conditioned
so much the better

ıcclimated

other method of beating the
goes under the long recognized
oorly understood term of *ac*
ation When even strong
healthy persons are first ex
to a very hot environment
find they are unable to work
and strenuously By a process
climatization they can adapt
selves to hot weather work
ı this adaptation ıs advanced
ın extreme heat performance
be nearly as effective as ın tem
e surroundings

If you have to work long and
ın the summer heat don t try
ıt all on the first hot day Start
rly ın the summer as you can
build up your tolerance gradu
Also be sure and take ınto ac
ı your age physical fitness and
ability of water and salt

ecent studies by the Army have
ed doctors gain considerable ın
ınto the mechanism of acclima
ıon When for example healthy
ıg volunteers trained ın temper
climates are exposed to tropical
ther their pulse rate increases
r body temperatures rise and
blood pressure ıs unstable es
pecially ın an erect position They may faint or collapse

Even trifling work may become fatiguing, and more burdensome work rapidly leads to exhaustion Thirst headache shortness of breath, giddiness nausea, vomiting, loss of appetite apathy, irritability and, ultimately a complete unwillingness to continue work may result

With acclimatization however, this picture changes If the work load ıs increased gradually over a period of about a week the same person can perform his work with only slightly higher than normal pulse and temperature The man who was once exhausted ıs now cheerful alert and vigorous and may be able to stand for hours without fainting

In addition to perils of the heat ıtself there are the additional haz ards of the sun s ultraviolet rays Ultraviolet rays are responsible for giving your skin a fine healthy looking tan But here too you may be ın great potential danger unless you know how to protect yourself

Radiation that produces sunburn constitutes less than 0 2 percent of total sunlight but the degree of sun burn that develops from ultraviolet radiation varies with the individual The dark skinned person ıs less sus ceptible to the dangers of ultravio than the person who ıs blond blue eye

Besides individual facto may be racial or constitutio are also environmental f the north temperate zo reaches ıts highest point

and it's quite possible, therefore, that a more severe sunburn may be received at the beginning of May than at the end of August The possibility of burn is at its greatest when the sun is directly overhead

The time of day is also important Even on a bright, midsummer day, no sunburn is likely to occur from exposure before 8 A M and after 4 P M , in contrast to mid day when the maximum degree of sunburn can be expected

Conditions of the atmosphere contribute to the effects of the sun on the skin Sky radiation which is sunlight that has been scattered by the gas molecules of the atmosphere, will produce burning without exposure to bright sunlight On lightly overcast days therefore particularly in a fog, the burning rays are scattered and can produce severe sunburn By contrast dust particles and smoke that contaminate the air may provide considerable protection against sunburn by absorbing sunburn producing rays A cloudy day is no protection against sunburn

According to one official publication of the American Medical Association 'Gradual exposure to the sun is the safest and simplest method of acquiring an attractive tan This method allows the skin to build up enough natural resistance to the sun by increasing pigmentation At the same time it minimizes the immediate possibility of a severe sunburn with its accompanying discomfort disfigurement "

Tanning lotions also may be used Most of the popular makes are both safe and reasonably effective read the label carefully The advantage of suntan preparatio that they permit a person to in the sun for a longer time w severe burning than if the skin unprotected

Suntan Lotions

Suntan preparations conta n icals called *sunscreens* which a the burning rays in varying d Of course some people are a to the ingredients of tanning and this may add insult to i No preparation is guaranteed safe for all users, nor to pro persons under all circumstanc when wisely used, suntan lot help

Recently oral tablet med has been developed to promo ning of the skin One of methoxsalen has been wide with fairly good results but i be best to check with your ov tor before going to the drug, your supply

One physician who tried th let on a group of Chippewa I is not impressed He sugges those who react excessively t light might be better protect wearing wide brimmed hats an able clothing during the months

• • •

There is no short cut to ke cool At one time or another d the summer, you may have to into practical use all of the p mentioned in this article Bu least, you will know what to d

An ingenious new method is expected to provide

salted Sea Water for Israel

Condensed from Econom c Horizons

ISRAELI DEVELOPED PROCESS for desalting of sea water is about e developed on a major scale n announcement of American el cooperation in the project made in Israel following the ing of an agreement between the el Government and Fairbanks se & Co for the development of n

Zarchin an electrochemical en eer in Israel

The invention has been tested in oratories and in a pilot plant on Mediterranean coast of Israel, d built by Zarchin

The results of the tests are secret t engineers are convinced that r Zarchin s desalting method uld cost no more than the average ce of well water in the United tes"

• • •

The new process is based on the ct that ice formed by freezing sea water is free of minerals including salts

Doctor Zarchin's invention solves the problem of achieving artificially what nature has been doing winter after winter along many coastlines of the world where the natives use such melted ice as drinking water

His method calls for the pumping of sea water and spraying it into a vacuum tank Because there is no pressure in the tank, the water be gins to evaporate quickly

This evaporation causes the tem perature to drop sufficiently below the freezing point, freezing part of the salt water

While vapor floats up in the tank, the ice crystals fall to the bottom, in the remaining brine This mixture is transferred to a second vessel during such transfer the brine and ice are separated mechanically

The vapor is meanwhile piped out of the first tank in order to mai the vacuum there and into th ond vessel where it meets crystals melting them into water

Doctor Zarchin came from the Soviet Union w

Economic Horizons published by the American Israel Chamber of Commerce and Industry Inc

a research assistant at the Lenin grad Technical Institute Working on similar problems there, he was awarded a prize by the Soviet government Shortly afterward, he was arrested for "Zionism" and sentenced to five years of hard labor at the asphalt mines of the Ural Mountains

David Karr chairman of the executive committee of Fairbanks Morse, announced in Israel

'After exhaustive study and tests by our engineers Fairbanks Morse entered a joint venture with the government of Israel for the construction of plants to convert sea water into fresh water by means of the process developed by Dr Zarchin

"Construction of the first plant for mass production to cated in Israel will begin 1960 We plan to locate a plant in a semiarid region southwestern United States

' Our next goal is to crea plants to produce a billion day of fresh water world by the end of 1965

' Our engineers est we achieve full and regular trial production, the cost of under the Zarchin process will low as—or lower than—the average cost of delivering water to consumers in the U States which is now approxim 40 cents per thousand gallons

Giant Reactor To Create New Elements

IN ONE of the giant atomic reactors at Savannah River S C about a pint of plutonium the atomic bomb element is being bombarded with neutrons

Two or three years hence chemists will extract the world s largest quantity of the extremely rare manmade chemical element cal forni ...

[illegible]

toward understanding and possibly using the heaviest known elements that can be converted in a step by step process into heavier elements

[illegible]

Doctor Glenn T Seaborg Nobelist discoverer of many of the new elements of the atomic age described the new long range national progr produce research quantities o thetic elements 97 98 and 99

About 100 grams (three ounc curium element 96 will be pr by 1963 in the first step By th

[illegible]

very high concentration of ne that will be created in the new re At the end of two or three more further changes will have occurre there will be extracted about a gram of californium

A milligram of californium w many times more than scientists ever been able to assemble It w a treasure worth mill ons of dollars have intangible value beyond pric



What will it be like on the moon?

A prize winning scientist answers this question

by Dr Harold C Urey

[illegible]ensed from Product Eng nee ng

E SURFACE of the moon is a [illegible]ndy desert somewhat like the [illegible]a Grad ents will not be much [illegible]er than 12 degrees Even in the [illegible]ntainous areas we will find no [illegible] than a few crags—just a grad [illegible]rade everywhere

[illegible] addition our study of lunar [illegible]graphs indicates that the sur [illegible] of moon has many pits covered [illegible] a dark gray material We do [illegible]et know the depth of these pits [illegible]hey will obviously affect the de [illegible] of any lunar car

[illegible]nother feature designers will [illegible] to cons der is the chemical re [illegible]ity of the moon s surface It s [illegible]r a very high vacuum and has [illegible] thoroughly degassed for a long [illegible]od of time It may be that we'll [illegible] solids that are pretty sticky—that the lunar vehicle may stick to this gravel

There is also the possibility that oxygen has been driven out of the surface rocks in which case they may be chemically very active We cannot know these things until we can actually put an instrument pack age on the moon

That Question of Temperatures

We know that temperatures will also have to be considered On the surface temperatures may vary from 100° to 125° Centigrade down to minus 100° Centigrade or more Travelers will need to wear insul ated suits to protect them from these extremes A stroll by an individual would be quite hazardous

Atmosphere and Gravity

Every time we fly in one new jet airplanes we live in a vacuum—lack of an not too serious a problem. moon s low gravity will

[illegible] (F b 29 60) © 1960 [illegible] Publishing Co Inc [illegible] New York

vantage in certain ways Buildings can be made of lighter even flimsy materials We can throw up an enormous apparatus of some kind and not have to worry about wind blowing it down

The gravity is one sixth that of the earth This will make a big difference in the size and character of all structures And I do not think we shall have to concern ourselves with radioactive substances on the moon —I feel that they will actually be less abundant than here on earth

How Do You Find Water?

I also expect that the moon s surface will contain water within the rocks as water of hydration All we will need to do is establish a heating mechanism to raise the rocks to the temperature necessary to drive out the water This also means that we can make oxygen without bringing it from earth Solar reactors may eventually be used to do this but at present they are expensive fragile and hard to handle If they are successfully developed they could be a source of very cheap lunar power

And What of Food?

Of course all agriculture on the moon will have to take place in closed places There is no life as we know it that can survive the conditions of open lunar space Bacteria plants or any other living organism would be killed within a few [illegible] by exposure to the ultraviolet and particle radiation on the [illegible] of the moon

We must either take food [illegible] or attempt to grow it on the [illegible] And growing food on the moon [illegible] prove very troublesome because [illegible] not think that the moon s surface [illegible] soil We know from our experience on earth that one cannot [illegible] plants in fresh lava The hydroponic growth of plants (tank farming) [illegible] not unknown on the earth and [illegible] be developed further

Power for Lunarites

It will be very difficult to [illegible] port major sources of energy [illegible] moon An atomic reactor is one [illegible] sibility Another possible source [illegible] energy that could be used [illegible] moon although it has never [illegible] tried on earth is subterranean [illegible] generated by the explosion of [illegible] bomb Incidentally I am a[illegible] by certain people that if we e[illegible] hydrogen bombs beneath the [illegible] face of the earth we will be a[illegible] use this heat to distill water [illegible] process would be so inexpensive that we could use this water [illegible] irrigation

If this is true then desert re[illegible] that lie anywhere near an o[illegible] could all be irrigated This to[illegible] is an enormously important de[illegible] opment that certainly should [illegible] pushed as hard as it can be

---

Dr Harold C Urey of the University of California won the Nobel prize for discovering and isolating heavy hydrogen The discovery of chem [illegible]

To Get There?

fore we can reach the moon, have to develop a vehicle with thrust engine However there thing impossible in the actual n of equipment necessary to nstruments on the surface of oon The big thing we need is ministrative decision in Wash that it shall be done and that st in dollars and manpower e paid To me it was simply ing that the same week the s hit the moon we cut back priations on jet propulsion

: design problems involved in np to space will have to be by today s engineers Within l years they will be able to vehicle to the moon that will ut information back to us er I am very sorry to say that ts as though the U S S R is to do the job before we do will do it first because they l working on space problems we did

ut ten years ago we said it use talking about interconti ballistic missiles because the ctive range of the A bomb o small and the development recision guidance mechanism l unlikely It was the develop of the H bomb that really the ICBM so important

Soviet government on the hand decided it would make siles big enough to carry large A bomb to do the job They heir decisions early and head in the direction of getting an ous rocket engine

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In the experimental sciences, great men are never the promoters of absolute and immutable truths Great men may be compared to torches shining at long intervals, to guide the advance of science They light up their time, either by discovering unexpected and fertile phenomena which open up new paths and reveal unknown horizons, or by generalizing acquired scientific facts and disclosing truths which their predecessors had not perceived

—*Claude Bernard*

Why Go to the Moon?

I think the whole space program will pay for itself even if we bring back nothing from the moon—or, later from Mars and Venus In attempting to live and travel on the moon for example men will overcome earth world difficulties in construction and design Transistorized apparatus will give us communication equipment that is less massive

When an enormous effort has been made to reduce the weight of apparatus to a minimum it can be expected that many terrestrial applications will become feasible Such applications will probably pay the entire cost of space exploration Surely the communications satellites will further the transmission of information on earth

Secondly there is the en thrill we can all get Whe about exploration to the climbing Mt Everest, ous pleasure in these ad see the back side of t

my mind, the most amazing feat of exploration since Columbus What are we going to spend our money for in this age of the different society? Just to let someone make a car two feet longer and another foot wider? What is the use of this? I have everything I want I do not need more food or clothe... I ... f ... f
tr
sh

As far as intellectual gains go, space travel will enable us to understand much more about the origi... the universe than we have ever un... derstood in the past Becaus... moon is a dead object, it has a preserved record of what has ... pened in the solar system ... any other accessible object

• • •

Also our view of the distant st... will be greatly improved and t... will enable us to learn much m... in regard to the structure and ac... processes of the universe

Find New Clue to Inherited Diseases

SCIENTISTS HAVE DISCOVERED a strange trait inherited by fruit flies which provides a possible clue to why people keep getting some rare inherited diseases

The fruit fly trait is harmful—it can kill offspring whose parents both transmit it Since the fruit fly trait violates the law of natural selection the trait should almost disappear the law predicts

The law of natural selection states that inherited traits which are most advantageous to a species will survive while harmful ones should almost disappear

Doctor Laurence Sandler and research assistant Yuichiro Hiraizumi of the University of Wisconsin say the trait actually seems to occur with increasing frequency It appears to have existed in flies for a considerable time

Doctor Sandler explained that a curious destructive gene is responsible for the continued occurrence of the fruit fly trait He thinks a similar gene might cause the unexpected high frequency of occurrence of the inherited human diseases

Genes—tiny elements which make up chromosomes in cells—are the ... sengers which transmit inherited ... acteristics Genes occur in pairs in ... cells—two for each characteristic ... normally do not affect one another ... the curious gene found by the W... sin geneticists does something no ... gene h... been f...

sperm cells getting the broken ch... some will not fertilize eggs This ... only the SD gene's characteris... passed on

Though SD like genes could ... harmful traits on a species Dr Sa... said that the presence of such ... apparently does not mean certai... tinction for the species The exp... tion he said lies in the fact tha... SD gene's partner seems capabl... building up a "resistance" to being ... ken Dr Sandler explained how ... might occur He said that not all the ... gene s partners are susceptible to ... the sturdy ones survive



**RCHER NOTES 3 500
ENT LANGUAGES**

t three people from different of the English speaking world e same room and they may end lking to themselves

r maximum confusion the first subjects should be a Lowland man who speaks Broad Scots a native of southern India who ed English in his homeland third person might come from other part of the world where sh is the national language

ien Eric P Hamp associate ssor of linguistics at the Uni y of Chicago says these three e would not understand each he is not talking of limited unication but of total incom nsion

hey might just as well be ng Dutch Danish and Ger says Hamp

preparing a course on *Lan s of the World* Hamp recently led figures showing there are ast 3 500 odd erent lan guages living and dead, which are or were known to be in use in some part of the world The estimate is a conservative one and does not in clude any of the numerous pidgin or creolized tongues

Hamp says I use the term lan guage to describe any single system of speech that is intelligible to the users of no other speech system A New Englander a Southerner an Australian an Irishman and a Cor nishman while they have different dialects can communicate with each other I do not call these various speech forms languages and conse quently do not count them sepa rately

But Broad Scots Indian Eng lish (not Oxford English which



many Indians speak) and all other forms of English constitute at least three mutually unintelligible groups and are counted as such

NEW BUSINESS PHENOMENA: THE ORGANIZATION MAVERICK

Individualism in the executive suite has become a desirable thing in recent years

But Director George S Od orne of the University of Michigan B reau of Industrial Relations that new values will be f overnight among org

Writing in the M

Review, Odiorne says, "The company which is manned by alert managers has undoubtedly already begun switching its signals among the off

people dull to messages emitting from the offices where the brass is situated

"The antennae of their 'radar sets' have already begun to point up that the Old Man is calling for individualism, for nonconformity, and maverickism The lesser lights may be counted upon to respond to this faint but clear message ' Odiorne predicts



'The real problem is this what is the acceptable mode of behavior for the New Maverick? You may rest assured that it will not extend to punching the Old Man in the nose or stealing his cigars but will nestle itself closely to the image of maverick behavior that can be induced from what he says and what he approves

'Certainly there will be more 'tough talking about the need for backbone and up to-date versions of Elbert Hubbard s homilies out of past More often there will be a shrewd attention to the arts of disagreeing and speaking up freely when in the presence of the seniors

without actually saying an intemperate or brutally frank.

"Once these superficial arts adapting outward behavior to new line of maverickism have firmly installed, there still the basic problems of what thinking junior or midd e should do in order to overcome debilitating effects of too much formity among high talent people

"Most of the lasting effects of New Maverickism will be th an infusion of individualism business from the recruits

In some instances, he believes will accelerate the rise of ind ism and maverickism in old who have carefully concealed tendencies in this direction the regime of sentimental to ness

The major immediate however among the experts bulk of managers and staff will a new conformity—to a beh which looks like maverickism' concludes

NATURE OF HYPNOTIC CONTROL DISPUTED BY EXPERTS

To what degree can a hypn control a person and what is nature of this control?

Can for example, a hypno freely exert his will upon a subject Or does the nature of hypnosis l the hypnotist merely to focusing subject s attention on ideas which he later acts in his own and according to his own experi tal learning independently of hypnotist s personal wishes?

rding to *The New York Times* ion to this problem might be in a test that would deter whether a person can be in hypnotically to commit an t would be unacceptable both ty and to himself

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points out that the subjects notivated to do these things e sake of the advancing scien nowledge and they felt that pnotist would insure the safety nvolved

the past 25 years Dr Orne there have been only three ented cases reported of actual al behavior involving hypnotic tion

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ctor George H Estabrooks one well documented case in a person committed *murder* ther criminal acts at the behest hypnotist

said that a possible explana for this case might be that the otist had altered the subject's nality, making the criminal act perfectly acceptable to him

different view of what hypnosis is was offered by Dr Milton Erickson of Phoenix, Ariz, a ing authority in the field

"Hypnosis is a state of awareness that can be directed A hypnotist merely attracts a person's attention and asks him to use his own body learnings and conditionings according to his own experience"

'TRANQUILIZER GUN' MAY BE ADAPTED FOR HUMAN USE

The tranquilizer gun which is used extensively in the cattle industry is being studied with the idea of developing a similar device for human use

Sheldon D Feurt, dean of the University of Tennessee College of Pharmacy and coinventor of the gun, believes it would be valuable in many emergencies such as rescue work in which the delivery of liquid drugs or sedatives over relatively long distances is desired, *Scope Weekly* reports



For instance, it could be used to administer a sedative to a fallen mountain climber to ease his pain In addition, Dr Feurt thinks the gun if used by qualified could be utilized in certain p police work, such as halting or prison riots He also sees a mote" possibility of its being to shoot drugs into dangerous tal patients

The tranquilizer gun lo conventional weapon

Review, Odiorne says, 'The com pany which is manned by alert man agers has undoubtedly already be gun switching its signals among the offices occupied by the lesser ranks Twenty years of hiring and training for conformity hasn't made these people dull to messages emitting from the offices where the brass is situated.

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The tranquilizer gun conventional weapon e

oversize barrels It shoots a special hypodermic syringe, which injects its contents on contact with the sub ject It comes in two models a rifle accurate up to 50 yards, and a pistol accurate up to 20 yards

The gun is now employed chiefly to quiet unruly cattle to administer liquid medicines to sick animals, and to aid in the capture of suspect ed rabid dogs

SPACEMEN AND SECRETARIES SHOW SAME NEUROSES

Two airmen who were confined in a simulated space cabin for 14 days developed the same psychic symp tom as white collar workers

The pair had persistent and recur rent headaches *Factor* reports

They were the same kind of headaches often found in secretaries and other people who don t have a chance to move around much on the



job said Dr Richard Thomas Day, physician who monitored the two during their confinement at the Air Force s School of Aviation Medicine at San Antonio

Doctor Day noted that the two airmen were subjected to these sources of stress

1 Constant noise from the equip ment—comparable to the incessant of typewriters in an office

Feeling of being watched and overheard—comparable to the bo keeping an eye on his employee a an ear ever tuned to what he says

3 Monotony of the rout ne comparable to having to go thro the same motions all day long a job

MOST MURDERERS SANE, PSYCHIATRIST FINDS

Most murderers are not men ill but they have an abnormal infantile disregard for human li

This is the conclusion of Dr M fred Guttmacher, in a new book *Mind of the Murderer* Dr G macher who teaches psychiatr Johns Hopkins University and University of Maryland is in vate practice and for 25 years been chief medical officer to the preme Bench of Baltimore

Of 175 cases studied by Dr macher 53 of the murderers mentally ill and 105 were clear psychotic The remaining 17 seriously abnormal but a psy at the time of the crime could definitely established

Nearly every murder comm by an insane individual is pre by some signs of insanity, Dr macher said One-third of th sane murderers had been previ institutionalized for mental ill

The crimes of an insane kille generally very bloody and planned The victims are ofte timate associates, frequently his children Most insane killer no remorse and confess freely motives seem completely to a sane person

The Library of Congress has information on everything from flapjack flipping to the color of a mastodon s eye

Four Hundred Miles Of Bookshelves

by Jay Scriba

Condensed from The Milwaukee Journal

FEW YEARS AGO a Chinese cook from Muskegon Michigan, sent ied smelt to the Library of Con s to try to establish copyright recipe for cooking it Impressed h the man s seriousness if not judgment the Library tucked little fish away in the vaults donation was only a little un al The Library already had nuel Johnson s cane, Mrs Abraham Lincoln s seed pearl necklace, a death mask of James Joyce a book bound in human skin and a scratchy recording of Federal Judge Learned Hand whanging a guitar and singing The Iron Merrimac'

Always an indulgent repository for all kinds of odds and ends the Library has attracted a giant's closetful since its founding An Ohio professor who liked flutes once willed the Library his lifetime collection—all 1,521 of them The creator of 'Hopalong Cassidy" contributed manuscripts of 30 western novels plus 10 000 card references on everything from flapjack flipping to Apache scalping techniques Actor Jean Hersholt gave a $75 000 collection of Hans Christian Andersen

The curious visitor to the vast rococo building across the mall from the capitol dome must expect startling juxtapositions

The Milwaukee J urn l (Ma ly The Journal C mpany M

e typewriter and multicarbon pies As a result, whereas Abra m Lincoln left 18,350 personal pers in the White House after his ssination presidents after Cool e have had to find separate hous for their bales of paper mementos Chief task of the Library is to pro le information that can be found where else To do this job it has n forced to become a near mira of organization and efficiency

oks on Loan

Wh le the Library is still, techni Congress library, in effect it is the library of the nation Any over 16 can use its facilities a surprising minimum of red While it is not a circulating ry—you can t take a book from k s to the s 20 million catalog s each year to 9 000 libraries, ng them time and expense It ishes the National Union cata

e Library also answers ques and it is seldom stumped t was the color of a mastodon s What is the weight of the e on the capitol building? How words are there in the English nge? Could you suggest a name wins? From 9 in the morning as late as 10 at night clerks on the thousands of questions flood in by mail telephone and rson holars find the Library a particularly happy haven With its 414 miles of bookshelves 225 special study rooms and multilingual staff, there are few aids and comforts the library can t provide

'People come in here desperate because they lack the information they need to write a book or a thesis the chief of one highly specialized section has said but after three or four weeks they avoid meeting my eye for fear I may give them more material As a result of this warming atmosphere the Library estimates that there are always at least 200 books in preparation within its walls



Last year the legislative reference branch of the Library handled 77 396 queries from congressmen a 12 percent increase over 1958 and 80 percent more than in 1950

Since the Library has grown into a formidable institution in its own right congressmen sometimes grumble at appropriation time Most lawmakers applauded however when the Library established an oriental research center in Japan and sent an exped tion to Palestine to photograph rare manuscripts at St Catherine s olde t Christian monastery in the world Oficially the only regret at the Library is that it di get to Leiping China in t cord a va t number of that now may be lost

The Library own

eign collections in the world of Chinese Japanese and Russian books It owns the libraries of Czar Nicholas II and Adolf Hitler a set of Rudyard Kipling s poems printed on dessert plates microfilm copies of all Sears Roebuck catalogs since 1888 and the personal papers of Gen Billy Mitchell Its stacks hold 24 000 books on magic the world s most complete hypnosis library dozens of scores written by Bach and Beethoven and a complete file of the *London Gazette* from 1665

A record collection at the Library includes Iroquois Indians chanting rain songs Mississippi boatmen bawling out their sounding calls and Pennsylvania miners singing hymns deep in the pits

Its film collection begins with the first motion picture ever copyrighted Thomas Edison s presentation of ' Fred Ott's Sneeze —running time from gasp to Gesundheit two seconds

Various departments of the Library offer talking books to the blind chamber music concerts played on its own Stradivarius violins and reading by such noted poets as T S Eliot, W H Auden and Robert F

The Library keeps people staff who can speak Moso and in the Cyrillic alphabet It scribes to 1 400 newspapers and 000 magazines It prints doze publications on its own pres sells unusual phonograph recor

"Dial a Book" Plan Proposed

To give better service the Lib is experimenting with a sy whereby a patron could di book ' It is also working with a crocard system whereby a sp camera can reduce a 500 page to one three by five inch card ily legible under a special enla

But with all its virtues a la can take comfort in the fact there are some things that eve Library of Congress does not or does not have It has a 175 X collection of literary fan that even its most imaginati vants have never been able to sify It does not have a co *The Whole Booke of Psalm* first book printed in this coun 1640

Roaches May Spread Food Germs

COCKROACHES MAY BE spreading food poisoning germs a study at Kansas State University indicates Dr T H Lord Kansas State bacteriologist captured 100 groups of brown banded roaches and found that about one fourth contained the bacterium *staphyloccus aureus* which is responsible for food poisoning

ecause 25 percent of the roaches contain this germ Dr Lord thi reasonable to assume that food pc ing germs may be spread to uncon nated food or to other places by insects

• • •

The brown banded cockroach is cult to control he said because it travel over a wider area in searc food than the German cockroach

Cold Facts About Cryogenics

ɔNSIDER a new super energy rocket fuel that will give the United ies an unrivaled lead in heavy e vehicles, a hypersensitive electic device which can detect radar als returning 25 7 million miles ı Venus, a new method of storhuman blood indefinitely—these but a few of many new dramatic lopments made possible by the nce of cryogenics

lthough the field of cryogenics is tively new, the name itself is ded from the ancient Greek word os' meaning "icy cold" In its ent connotation, cryogenics ls with the science of extremely temperatures approaching abso zero At this end of the temperae scale—in contrast to the limithot end—there is a lower limit minus 459 69 degrees Fahrenheit minus 273 16 degrees Centigrade ond which the temperature candrop

n this frigid realm "everything pens differently' Molecular mo defies gravity and creeps up and over the walls of containers [See The Gas That Defies Gravity SCIENCE DIGEST, Oct 59] and metallic lead rings like a bell when struck

As early as 1799, the French scientist Guyton de Moreau converted ammonia gas into a liquid by cooling it A quarter of a century later Michael Faraday, famed English physicist, succeeded in liquefying numerous gases

The general principle in the liquefaction of gases involves forcing the gaseous molecules close together to form a liquid by subjecting the gas to pressure and cooling

A gas is first compressed and the heat of compression removed Then the gas is allowed to expand in a closed system whereupon it becomes cooler—a phenomenon known as the Joule Thomson effect

The first portions of the cooled gas are used further to cool subsequent streams of the incoming gas until the liquefaction temperature is reac

Cooling processes such as t just described, however, ar ficient for reaching tem

low that of liquid helium To drop the temperature the remaining seven degrees Fahrenheit toward absolute zero, scientists of the Arthur D Little Company have developed an ingenious "magnetic refrigerator"

The first and still by far the largest commercial application of cryogenics is the production and use of liquefied gases—of which $250 million worth are consumed annually Last year alone over 70 billion standard cubic feet of liquid oxygen were produced in this country About half of this oxygen output is used by the steel industry

Oxygen enrichment of the air blast used in blast furnaces has increased iron output 10 percent or more at a cost of about $5 per ton for the oxygen Similarly, the use of high purity oxygen in open hearth furnaces and electric furnaces has been found to reduce the time required to oxidize impurities with consequent increase in steel production

ANOTHER BIG CUSTOMER of high purity oxygen is the chemical industry which utilizes it in manufacturing ethylene oxide Oxygen is also used in the partial oxidation of natural gas to such important compounds as acetylene formaldehyde, and alcohol Many chemical engi-

Doctor William W Hassler

neering processes conducted at cr
genic temperatures are provid
teresting and promising res
which will ultimately be tran
into greater efficiency and un
new products

Liquid oxygen also constitute
convenient method of supply
breathing oxygen to passengers
crews of high altitude, long ra
global aircraft It replaces the
compressed oxygen cylinders w
previously provided this brea
necessity

About ten years before W
War II, German scientists fou
the possibility of using liquid
oxygen as a compact oxidant in
rockets With the advent of the
sile and rocket age, liquid oxyg
"lox" as it is called, has establ
itself as an important compon
fuel mixtures

Last summer the Air For
moved the sign "Apix Fertilize
from a sprawling West Palm
plant which purportedly was m
ammonia Actually, this camou
production unit was design
manufacture liquid hydrogen.

The Air Force has labeled
hydrogen "the ultimate che
fuel" and early this year the Na
al Aeronautics and Space Adm
tration announced it was redesi
the upper stages of the Saturn
rocket to use liquid hydrogen as

This fateful decision constitu
technological gamble to overtak
Soviet Union's lead in rocket
In effect, the space agency is pu
its chips on the ability of hyd
rocket engines to hurl multiton

space The payload capac
of the Saturn with hydrogen
ets in the upper stage will pos
the capability of sending
ned capsules on a round trip to
moon

quid hydrogen as a rocket pro-
nt used in conjunction with
d oxygen can produce about 30
ent more power than the kero-
liquid oxygen pair that has gen
been used to power rockets
3 clustering eight rocket engines
le first stage and utilizing liquid
rine as the oxidant (agent to
d up the release of oxygen), the
rn will produce 1 5 million
nds of thrust at take-off This is
times that of existing U S rock
and double the thrust used by
Russians for space launchings

ally spectacular is the impact
ryogenics on the field of electron
Fifty years ago Heike Kammer
h Omnes a Dutch scientist
dying the behavior of matter at
remely low temperatures dis
ered that some metals lose all
ctrical resistance just above abso
e zero and become superconduc
e Once started such an electrical
rent will continue to flow through
superconducting circuit indefinite

This phenomenon of superconduc
ity is the basis of a project spon
red jointly by the government and
ternational Business Machines to
velop a cryogenic computer en
sed in a frigid cabinet no larger
an a basketball! Such a miniatur
ed unit would be the answer to the
cket designer s dream of a compact
computer that can be snugly accom
modated in a space satellite

In place of transistors tubes and magnetic cores this miniature computer will use ultrathin glass wafers sandwiched together with microscopic deposits of conductors such as lead and tin When immersed in a liquid helium bath these circuits have a switching speed 50 times that of the fastest transistor and can operate indefinitely at speeds of a billionth of a second without wearing out

At ultralow temperatures infra red and microwave instruments also become extremely sensitive When cooled to cryogenic temperatures anti missile missiles using infrared devices to track down their targets are able to sight approaching missiles at four times the distance previously possible

And solid state microwave amplifiers known as masers when cooled in liquid helium at minus 452 F become extremely sensitive receptors capable of detecting a radar signal rebounding from Venus They can pick up in New Jersey signals that have been bounced off an artificial satellite in California

Researchers at the Bell Laboratories believe this development portends the use of cryogenic masers in the establishment of a global communications system which would include the transmission of [illegible] images as well as written

Other government [illegible] perfected a cryogenic [illegible] freezing whole blood and

stead of for the three week period currently used

Workers at Syracuse University are using cryogenic temperatures to preserve semen for artificial insemination experiments with cattle And the use of liquid nitrogen as a coolant in shipping containers offers distinct advantages over ice in shipping perishable foods long distances

Aside from the innumerable practical benefits obtainable at low temperatures cryogenics also offers scientists an unparalleled opportunity to study the basic properties of matter For as molecular motion comes to a virtual standstill at temperatures approaching absolute zero the individual characteristics of matter become more apparent

At a recent meeting of the American Physical Society, Dr Donald Hughes of the Brookhaven National Laboratory reported that he had successfully used cold neutrons (cooled in liquid air to about minus 400 degrees F) to reveal the motions of atoms in liquid water

From his studies Hughes concluded that the atomic motions of water resemble much more those of a solid than of a gas'

THE SPECTACULAR GROWTH of cryogenics since 1945—when there were only seven laboratories in the country devoted to low temperature studies—is evidenced by the existence in 1960 of over 1 000 low temperature processing plants in the United States In fact, the cryogenics industry is doubling in growth about every four years And this, experts agree, 'is only the beginn

Viruses Cited as Argument for Spontaneous Generatio

THE THEORY that new life may originate spontaneously from organic matter popularly believed to have been disproved 100 years ago has been advanced by a biologist

He cites the difficulty of fitting viruses bacteria certain algae and

from a complex organic environment already present

This disputes the current theory of evolution that holds life originated from only one case of spontaneous generation and that all subsequent forms of living things have evolved *from that* case

Doctor John Keosian director natural sciences Newark College Rutgers University reported in journal *Science* that it would be m *plausible to* accept present day viru as units of recent and present or than to suppose they have descen through some 2 billion years relativ *unchanged*

He asserted that it should not assumed that an organism simply cause *it is newly arisen would have* adaptive features to cope with co petition Also organisms with inco plete metabolisms may arise and s vive by becoming parasites on exi t organisms having complementing m tabolisms

An instrument called the electron microbeam is

Detecting Art Fakes and Forgeries

ndensed from The Technology Rev ew

EHIND A LOCKED DOOR on its third floor the Boston Museum Fine Arts has a collection of beau il things that it never displays re as well as downstairs it has types and all sizes of *objets d art* m many parts of the world and ny periods in history, but these fraudulent

They stand amid scientific instru nts with which this has been ven William J Young the ying gentleman who heads this oratory has devoted years—like father and grandfather—to ex ing fakes

He and his colleagues in other mu ms and laboratories have ex ined many masterpieces fluoro pically, spectroscopically and h other aids to perception

But still some works of forgers ig in great museums and deceive ectors dealers and students of because of the craftiness the tal and the patience of the crimi s who produced them

Henceforth it will be easier to de tect falsified art thanks to the de velopment of an instrument called an electron microbeam probe

Its potentiality in the art galleries was demonstrated last winter by a Massachusetts Institute of Technol ogy graduate student Norman L Peterson With it he proved beyond a possible shadow of doubt that a puzzling portrait of a lady (see p 41) which was purported to be the work of a 15th century Florentine artist was a phony

The electron microbeam probe is so new that only a few researchers have used it There are less than a dozen of these probes in this coun try and about the same number overseas Already however they have revealed so much about a great variety of solid materials that the Institute is offering a special course this summer in the design and use of the electron probe

To appreciate what Peterson did you must know a bit about both the forger s bag of tricks and this new means of detection

Buried Evidence

The prices now paid for ancient art are as alluring to some men as the vault of a bank and some have simu lated art with incredible skill They have pitted themselves against not only the experienced eyes of critics but also the x rays the microchemi cal techniques and the hi to and scientific records availa Young and his colleagues for which they have pla make a croupier trembl

ly Technology R view (Apr 1 60) © 1960 by Massachuse s Inst u e of Technol gy Cam e Mass

Hence the odds, to some gifted criminals, have not seemed too great

The forger never can wholly hide clues to his deceptiveness Some of the materials and techniques of artists in bygone days and faraway places are no longer known — the secret of manufacturing a blue found in the Palace of Knossos in Crete and in Roman wall paintings for example was lost between 200 and 700 A D But it is possible for a forger to bury the material that would betray him so deeply in layers of paint or metal that suspicious men will not dig for it

Honest investigators their employers and other lovers of art often are loathe to remove even a small part of a possibly irreplaceable object for chemical analysis Their reluctance to mar what is represented as and looks like, a genuine artistic and historic treasure can be counted on by a talented forger Indisputable evidence of the guilt of the painter of the portrait which Mr Peterson exposed lay behind this barrier to the use of conventional techniques

[illegible]

painted over another picture which was probably inferior — but might not this have been done by a Florentine artist in the 15th century?

When part of the patina was removed the portrait seemed strik[illegible] beautiful Many comparable pictures are highly valued and others who saw the painting in his laboratory wished that it could be displayed publicly Had the lady been wrongly imprisoned in his collection of fakes? Her admirers hoped so—and some of them thought so

Analyzed 4 000-Year-Old Glass

Young learned about the electron microbeam probe as a result of his friendship with Robert E Ogilvie assistant professor of metallurgy at M I T The probe was being used in Ogilvie's laboratory to study such matters as the history and composition of meteorites Obviously it could penetrate mysteries that tantalize the curiosity of esthetes as well as scientists

Peterson used it to analyze brown stripes about which [illegible] were curious on a piece of E[illegible] faience—decorated glazed quar[illegible] that was produced about 2000 [illegible] These stripes were only about [illegible] a millimeter wide but more [illegible] enough when compared to [illegible] amount needed for analysis T[illegible] were potassium silicate Peterson [illegible]ported and contained some of [illegible] which produced the color

In analyzing a speck of 4 0[illegible] year old Egyptian glass, which [illegible] mainly blue but had a brown p[illegible]tern on it he discovered that co[illegible] was responsible for the blue and t[illegible] the brown areas contained man[illegible]nese

Peterson also demonstrated [illegible] probe's versatility by using it to [illegible]amine a bit of glaze from a statue [illegible] a boy made in Whittington in

century After mounting this of material in bakelite polish and placing it in the instru he reported that this glaze was lead but contained small ts of zinc and iron

great advantage of the instru was that not only a qualitative so a quantitative analysis could de of an extremely small piece terial A mere sliver, thinner a human could suf This was netallur ere using obe find it with it ould trace gration of etal into er when etals were ed to

s suggest he metal its that could em the probe plain the of metallic objects With a of ancient bronze Peterson that the difference in the al activity of copper and tin sulted in significant changes in

e layer was formed over a de layer

he pointed out while these ex ents were being performed that the soldering in ancient objects also could be analyzed and dated ap proximately by noting its diffusion into the material on which it had been placed Work done to restore a work of art might thus be disclosed

But might not a forger fool later investigators by holding his work at a high temperature before offer ing it for sale? No because the dif fusion gradient of say tin in cop per would dif fer in an item that had been annealed for a short time at a high tempera ture from that in one in which the diffusion had taken place at room tem perature for a number of cen turies



Before a large picture such as the lady s por trait could be tested with an electron micro beam probe however a way had to

revealed no

Chicago meeting of the American Association for the Advancement of Science

Some of the newspaper accou of his work which were pub then implied that an electron beam probe was a relative little gadget Actually it

complex and very expensive instrument. In it a finely focused beam of electrons is used to excite atoms. The radiation that these atoms then emit is analyzed to determine both what the atoms are and where they are. Such delicacy is not easily attained.

With the M.I.T. instrument any element that is between magnesium and uranium in the periodic table can be found in an object that is only a micron (one thousandth of a millimeter) in diameter.

The Evidence Obtained

The sophisticated example of art forgery which Young asked Peterson to investigate with this device is about six times the size of a page of this magazine. How would you go about determining the authenticity of a painting that large with an instrument built to study things so tiny that you could put them in your eye and never feel them?

In the same way a geologist finds out about parts of the earth which he cannot reach—but with a tool originally made for physicians. A core of the material in the painting was extracted in a hypodermic needle. The finest needle on the market was jabbed right into the lady's cheek.

You cannot see the hole that is left unless you stand very close to the picture and ask Young to point it out. Even so, the core that came out in the needle was 50 times as wide as was really needed.

Finer needles can be made and the holes left can be so small that they will be invisible to an art connoisseur's unaided eyes.

The next problem that confronted Peterson was how to expose the paint and other material inside the needle to the finely focused beam of electrons inside his instrument. It had to be done without contaminating or mixing the pigments, so Peterson filed away one side of the needle. Then he evaporated a thin layer of aluminum over this shred of evidence in order to carry off the current of the electron beam and to prevent a charge that might deflect the beam from being built up.

A painting is a stratified structure. When Peterson placed the specimen in the probe, he could, with the help of the optical system, see distinct strata. He was able then to focus the electron beam on each layer and discover what each contained individually.

Titanium Was the Tattler

The artist had covered the original painting with a layer of white. To give the lady her fine complexion he also had mixed some green on his palette, and his brush had left a layer of it where the investigator's hypodermic needle pricked her cheek.

When the electrons were focused on the white layer and X rays from it were scanned, Peterson saw that this white paint contained titanium. Similarly, when he focused the beam on the green part of the core, he saw that it contained chromium and more titanium. It wasn't necessary to look further into the matter.

Titanium was first used in paint 1916 and has only been found in pigments of portraits made ce 1920 Chromium has been used ger, and chromium oxide might found in a painting made as long as 1862

These and other such dates are ifiable matters of record Neither inium nor chromium would have n in this masterpiece if it had n the work of a 15th century rentine artist It was clearly a gery—and a recent one

Suppose however, that the forger l not covered the original picture ow the lady's portrait in this way might, instead have tried to en ice the value of a 15th century ture simply by putting a famous ist s signature to it

But in this case the needle could have been inserted into the signa ture Then the pigments of the paint used for the signature could have been compared in the probe with those in the painting beneath it

Nature s masquerades are often more effective than those devised by men s cupidity Some of these are be ing explained with this instrument at M I T It is being used in deter

garding materials to which men en trust their lives

When more schools and industrial laboratories can help the way M I T has there will be, curator Young feels fewer phony 15th century ladies inhabiting the world of art

"Space Lighthouse" Is in Orbit

et of a space navigation system uch may revolutionize the art of vigation

With the aid of a Transit satellite stem ships and planes of all nations ll be able to fix their position with r greater accuracy than with the pres t means of looking at the stars or ning in to radio stations Navigators ll have a worldwide system that can used in any kind of weather

Transit 1 B is a 265 pound 36 inch

sphere The satellite missed going into the near circular orbit that was planned for it and went into an elliptical orbit with a maximum altitude of 479 miles and a minimum altitude of 233 miles Because of its lower than planned or bit Transit 1 B is expected to last only about 18 months

• • •

Two days later the eleventh series of Discoverer launched The launching itself fect but the Air Force agair recover a 300-pound ejected from the orb t

There is the possibility that man may hop the fences of his planetary backyard to reach . . .

STARS IN OUR NEIGHBORHOOD



by Fritz Leiber

WITH SPACEFLIGHT making giant strides and astronomers swinging around toward the belief that many suns have families of planets the nearest stars of our own sun have become of more than purely astronomical interest We just might some day reach them

Naturally our sun s own planets and their moons will be the first objectives for exploring spacecraft, manned and unmanned However, the chances of finding any life, except on Mars, are not large, while the hope of getting in touch with nonhuman intelligence in our own planetary backyard is small indeed

But if the search be widened to take in neighboring stars and their possible planet families—who knows?

There are about 100 billion stars [illegible]

[illegible]

So[illegible]e of these stars burning with fierce white or blue atomic fires are as much as ten thousand times [illegible]ghter than Sol our own sun Some, glowing redly, are ten tho[illegible] sand times fainter

Sol, a yellow star of medium br[illegible] liance and the type known as G [illegible] a nice comfortable middle-of-th[illegible] roader—not big but not sm[illegible] either In contrast, some stars [illegible] so big, that if one of them were [illegible] in Sol s place, it would engulf [illegible] earth and all the other planets out [illegible] and including Saturn, while a [illegible] tiny stars are actually smaller th[illegible] the earth

Some stars of the Milky W[illegible] multitude are as much as 70[illegible] light years away—that being [illegible] distance light travels in 70 [illegible] years *legging it along at 186* [illegible] miles a second *Such stars*, lyin[illegible] the far edge of the great gal[illegible] saucer are clearly impractical targets for interstellar explorati[illegible]

Of the Milky Way s *100 mi*[illegible] *stars only a few* thousand are vi[illegible] to the naked eye the rest are kn[illegible] *by telescopic* study ("telesco[illegible] stars") or by inference

A hundred or so of the brigh[illegible] *of the* naked eye stars have i[illegible] vidual names given them by [illegible] Greek and Roman star watcher[illegible] Sirius Arcturus and Capella [illegible] examples—or by the star ga[illegible] Arabs of the Dark Ages, who [illegible] responsible for such star name[illegible] Achernar, Altair, Formalhaut [illegible] Betelguese

lese and others of the brighter
; are also named for the constel
n or mythological star pattern
hich they appear, plus an iden
ng Greek letter Betelguese be
the brightest star in the con
ation of Orion the hunter is
called Alpha Orionis Rigel
nd brightest star in Orion is
ι Orionis Bellatrix is Gamma
nis and so on The great major
f stars have no names at all but
catalog numbers such as Wolf
Luyten 726 8 and BD plus 36
ees 2147

ith so many stars to picl from
nevertheless natural that we
ld be most interested in those
est at hand A primitive naviga
t Honolulu on Oahu would first
o reach the other nearby islands
the Hawaiian group—Maui
ai Molokai and so on—before
uring farther across the broad
fic What holds for island hop
: holds for star hopping

he star nearest the earth (after
of course) is Alpha Centauri
htest star in the constellation of
Centaur and third brightest star
he heavens However the Cen
r is a southern constellation and
ha Centauri never rises above the
izon for most of the United
tes occasionally southern Texas
l Florida get a glimpse of it low
the southern sky Its distance
m us is only about 4 light years
t is not unreasonable to assume
t space craft will some day ap
ach the speed of light A voyage
sa six years—allowing extra
to go up to top speed and come
down from it—is not unreasonable when we remember that Magellan s ship the *Victoria* took three years to complete the first circumnavigation of the earth

Alpha Centauri turns out to be a little on the complicated side Actually it is a group of three stars so close together they appear as one The closest of these by an interstellar hair is a faint telescopic star sometimes called Proxima Centauri The second star of the Alpha Centauri trio is a moderately bright one quite different from our own sun But by great good fortune the third in the group is almost a twin of the sun a yellow G type star just a trifle smaller than Sol Perhaps it is circled by another Venus Mars and Earth

Next after Alpha Centauri comes a little atomic beacon in the northern hemisphere Barnard s star about 6 light years away It is too faint to be seen by the naked eye but it has the distinction of being the fastest moving star in the heavens in 1 000 years it would appear to cross the visible sky (Most stars are anything but sluggish the sun itself and its planet family including the earth is moving through space at a pretty fast clip—12 miles every second toward a point in the constellation of Hercules)

After Barnard s star and at distances around 8 light years we find three faint telescopic stars that are only catalog numbers They are in fact the three stars already mentioned—Wolf 359 Luyten , and BD plu 36 degree 2147

ir m L ,

auk D Drake of the National Astronomy Observatory near Bank West Virginia, recently to listen in on the radio coming from Tau Ceti and of the nearer stars He might imid the cosmic static a pat series of pulses such as only ence should be able to launch aps the first half dozen prime rs (divisible only by them and one) one two five seven eleven

Odd to think of "Seven come eleven!" being the password of intelligence

Because of its fanciful nature, Drake s investigation was named Project Ozma after the dazzlingly beautiful princess of Lyman Frank Baum s much loved Oz books

But before Columbus sailed, the lands across the western sea were fanciful too



Porpoise Rated Genius Among Animals

ORPOISE a sea going mammal bigger brain than man s is gain ognition as a mental giant of mal kingdom the National Geo Society says

e scientists believe this small r of the whale family may be orld s smartest creature after d the chimpanzee Some specu at he might outrank the intellec imp if an I Q test suitable for nimals could be devised

average weight of a human is about 1 300 grams or a little three pounds The familiar por more accurately known as the nosed dolphin has a brain weigh rhaps 1 800 grams The porpoise as a complex voice apparatus suggests that it might conceiv earn human speech A captive Marineland Florida is reported to have imitated a brain researcher s voice so well that his wife burst out laughing Then the porpoise imitated her laughter

The relative intellectual standing of various animals cannot be accurately assessed at present but most zoologists who have stud ed porpoises are deeply impressed both with the porpoise s ability to learn—almost incredibly fast on some tests—and the wide variety of its emotional responses and interests

One practical joke enjoyed by captive porpoises is to push a helpless sea turtle around the tank Porpoises like to balance objects on their and throw them to visitor at a marine exhibit mistake of tossing a bon a tank of porpoises. the face

WOMEN SMOKERS WARNED ON CANCER OF MOUTH

A specialist in mouth cancer finds that it is more difficult to break women of the smoking habit than men, even when life is at stake

Women seem to have more of a compulsion to smoke, says Dr Walter W Dalitsch, who is a physician and dentist in the University of Illinois medical school

Dalitsch blames smoking for the rapid rise in oral cancer in women Twenty years ago this kind of cancer was a curiosity to be exhibited at a medical meeting because of its rarity

But today there may be a case in many hospitals at any given time



In the University of Illinois hospital recently there were five such women patients

The 'day of reckoning' occurs after about 20 years of smoking he points out Thus many more cases may be expected since a large segment of the female population has had this exposure

Indicative of the increase in mouth cancer are the figures at the University of Illinois hospital In the period of 1944-48 there was one woman patient for every 10 men In the 1954 58 period the proportion of [women] more than doubled

[Dali]tsch has found in general that women are less heedful of advice less cooperative in carrying out [or]ders in regard to ending smoking

Mouth cancer often can be [pre]vented by self examination early symptom perhaps a p[re]cerous symptom, is the presence thickened white patches on the [lin]ings of the gums, tongue and also cracking of tissues ulcers and pimples

Other standard symptoms sores that won't heal or chan[ges in] swallowing

BRAIN CLOT DEVISED TO DESTROY TUMOR

Ordinarily a clot in a brain ... is considered a fearful event in [medi]cine But two Washington D ... surgeons have deliberately ... duced an artificial clot to destroy brain tumor

Doctors Alfred J Luessenhop [and] William T Spence of George[town] University devised a plug in the form of a plastic ball and in... it into the main arterial channel of the brain It came to rest in front of the tumor and blocked it from further nourishment

The patient was a 47 year

gress
DICINE



by Arthur J. Snider

roman who had fainting spells since childhood, a numbness in the right rm and leg loss of some finger novement and a slight speech im pairment because the tumor was obbing vital parts of the brain of blood Seven weeks after surgery, he patient's symptoms disappeared

ON'T MASK NATURE S LARMS, PHYSICIAN WARNS

Are you a symptom masker? You ny be turning off your alarm bell

The alkalies you take for heart urn' or indigestion may be si ncing the sentry trying to call your ttention to an ulcer ready to bleed

The chronic headache repeatedly lotted out by aspirin may be moni oring a high blood pressure or cir ulatory disorder even a tumor

The motion sickness drugs may ut you back on an even keel after spell of dizziness or staggering but n the other hand these symptoms ould have been saying Keep your uard up because a virus infection present

Paregoric often stops persistent iarrhea but are you screening ame ic or other parasitic infection ul- erative colitis or a malignancy?

Symptom maskers, says Dr H Ivan Sippy of the senior staff of Northwestern University medical school, not only can harm themselves but also confuse the physician who tries to make a diagnosis

He points out that one of the first principles learned by a young doctor during his training is "Don't mask the symptoms"

In other words don't give the patient a pain stopping narcotic when an undiagnosed abdominal emergency is present Suppressing pain and tenderness might give a false impression that the disease is subsiding when it might be progressing to a dangerous stage

Doctor Sippy believes that fever is the most important of all symp toms to be watched for by the layman

But it likewise is the most neg lected

Many times he points out, the doctor is frustrated during a tele



phone report for illness when the patient cannot give an exact record of his temperature

The physician must make ci ion regarding a fever befo been reduced by aspirin temperature lowering dru

Everyone he adds sh thermometer, learn ho accurately, and take

ture before telephoning his doctor for advice

A surprising number of otherwise intelligent people believe they can judge fever by the way they feel A feeling of warmness is no indication of the presence of a fever Dr Sippy says It may only be a sl in effect due to dilation of the capillary blood vessels

While one should heed nature s warning signals he should not fall into the habit of being a hypochon driac The individuals who repeat edly telephone for medical advice for trifling symptoms may grossly ex aggerate them to gain the doctor s anxious interest

This only deludes the physician Eventually says Dr Sippy the phy sician becomes understandably skep tical Sometime when the trouble is real the doctor may himself inno cently mask a genuine complaint with telephone advice rather than make his customary investigation

VIRAL THEORY FOR LEUKEMIA STRENGTHENED

The theory that a virus may be the cause of acute human leukemia has been strengthened by studies on



volunteer prisoners who were in oculated with brain extract taken from patients who had just died of

The volunteers developed protec tive antibodies in their blood stream, just as if they were vaccinated

Blood serum was then withdrawn from the volunteers and injected into mice who normally are highly vul nerable to leukemia The antibode in the blood protected the mci against the disease

The work was carried out by Dr Steven O Schwartz of the Hektoen Institute for Medical Research Chi cago He believes this not only dem onstrates in clear cut fashion the presence of virus in leukemia but also the likelihood that a vacc ne may some day be developed for the disease

Considerably more research must be done to purify the extract and positively identify the presence of the virus

ONE IN FIVE SCHOOL TEEN AGERS ARE SMOKERS

Two out of three of Americas teen agers now believe there is some link between lung cancer and smok ing the Institute of Student Opinion finds in a poll on teen age smoking habits among 10 763 secondary school students

The poll showed that 21 percent of students in junior and senior high schools smoke cigarettes Twice as many boys smoke as girls

About 13 percent of the boys who smoke consume one or more packs daily, as opposed to 6 percent of the girls About 37 percent of the boy smokers consume less than a pack a week About half of the girl smokers use less than a pack

The poll found that 18 6 percent the boys who smoked started on regular basis at the age of 12 or der Well over half started by age

As for the girls, nearly 9 per- nt started regularly at age 12 or unger

The American Cancer Society ntends that one of the best ways combat the growing problem of ng cancer is to educate the public stop smoking The education ould start at the teen age level, e ACS says

For adults who will not or cannot re up the habit Dr Ernst L ynder of New York a foe of oking makes these recommenda ons 1 Smoke a cigarette low in r content 2 Don t smoke to the ry butt end of the cigarette, for e second half contains twice as uch tar than the first half 3 Don t y to inhale too deeply If you in- ale deeply 90 percent of the entire eight of the smoke is completely bsorbed by your lungs

URAL BIRTHS RELATIVELY NCOMMON STATISTICS SHOW

What are the chances of a couple aving twins? New statistics by the Metropolitan Life Insurance Com any show they occur once in every 5 confinements Triplets occur once n about 11 000 confinements and uadruplets once in about every 00 000 There were no quintuplets orn in the years under survey (1951 57)

The likelihood that a confinement will result in a plural birth varies with the age of mother The chances are smallest for teen age mothers—6 per 1,000—and increase with advance in age to a maximum of about 16 per 1,000 at ages 35 39

Frequency of plural births is greater for nonwhite than for white women



Of the 27 700 000 confinements in the United States during the seven year period less than 300 000 produced a plural birth in which at least one infant was born alive

Multiple pregnancy can be diagnosed with almost 100 percent accuracy from the 20th to the 27th week of pregnancy by a 'brain wave" machine according to Dr C A Novotny of the U S Naval Hospital, Portsmouth Va

Electrodes applied to the abdomen of expectant mothers permit a systematic search for fetal heart beats The number of babies is indicated by the slight differences in beats

NEW BODY SUBSTANCE FIGHTS VIRAL INFECTION

A substance that is released by the cells when it is invaded by a virus might be concentrated and used against local virus infections, such as a cold in the belief of D- Alick Isaacs of the N tute for Medical R

The substance is call

The virus infected

protect themselves with interferon particles but also confer resistance on other cells Interferon may be the reason many people have natural immunity to viruses all about us

Doctor Isaacs who discovered interferon says it is not linked to any one virus It is produced by cells in response to invasion by many types of viruses and is apparently effective against all of them

Interferon is simple to obtain says the researcher It can be pro duced from inactivated influenza viruses fowl plague Newcastle dis ease measles and poliomyelitis

Unlike vaccination which pre vents disease from occurring inter *feron is* apparently active once virus infections are already started in the *body*

HUMAN POLIO VIRUS SEEN INSIDE CELL FOR FIRST TIME

For the first time polio viruses have been seen and photographed in side the human cell in which they were formed



Hitherto human polio *viruses* have been seen under the *electron* microscope in *isolated and concen* trated form outside the cell

Doctor D C Stuart Jr *working* under an American Cancer Society ' in the New York State Depart Health laboratories in Al bany has found that the v formed in the cytoplasm ing the nucleus and not in the cleus itself, as has been sup

He also discovered that an ing number of viruses—som on the order of 100 000— produced in a single cell in a hours The polio viruses are that 100 000 of them occupy about one or two percent of the volume Polio virus is one of smallest agents known to infect It would take almost a mil them side by side to inch

Doctor Jorden Fogh a v ro working with Dr Stuart cult cells of human amnion the t the placenta that nourishes and tects the fetus They added viruses to these cultures sliced tiny cells as one would slice a of bread and made electron graphs of how the viruses within the cells

WOMEN LIE ABOUT AGE? IT S A LIE STUDY FINDS

In New York a Staten I physician asked 151 men and patients How old are you?

The men lied more often women dispelling the legend women do not tell the truth their age says Dr Nathan Mas the *Journal of the American G atrics Society*

Lying occurred more freque in the middle age group—30 to years—with the male sex pre nating in the overall percentage liars

RAIN FOREST' and 'jungle are frequently taken to mean the same thing But I have never liked the word jungle It has all the wrong connotations You hack your way painfully through the lush vegetation of the jungle dripping sweat in the steam bath atmosphere snakes hang from trees and lurk under foot leopards crouch on almost every branch and there is always a tiger just beyond the impenetrable screen of foliage There are hordes of biting stinging and burning things The jungle is green hell

The true rain forest untouched almost untrodden by man is open carpeted with the richly variegated browns of many different kinds of fallen leaves sometimes brightly spotted with blue or red or yellow from flowers that have fallen from unseen heights above

The carpeting is thin easily scuffed away to show the red lateritic (rock decay) clay soil so characteristic of the equatorial regions There is no thick accumulation of leaf mold

Exploring the Rain Forest

by Marston Bates

Condensed from a chapter of the book The Forest and The Sea

like that of northern forests, no rich accumulation of humus The processes of decay are too fast to permit much organic accumulation in the soil

There is little vegetation on the forest floor since the light is too dim for plants There is a thin growth of tree seedlings (which have no chance to grow unless some catastrophe to a forest giant should open space), ferns, sometimes dwarf palms, or scattered thickets of huge leaved aroids (herbs), the sort of plants that also grow well in the dim light of hotel lobbies

But basically the forest floor is open, with vistas of a hundred feet or more, vistas framed and closed by the straight trunks of the trees that disappear into the vaulted green canopy that they support above

The cliche often used for the forest is "cathedral like The comparison is inevitable the cool dim light, the utter stillness the massive grandeur of the trunks of forest giants, often supported by great buttresses and interspersed with the straight, clean columns of palms and smaller trees, the gothic detail of the thick richly carved woody lianas (climbing plants) plastered against the trunks or looping down from the canopy above

Awe and wonder come easily in the forest, sometimes exultation — *sometimes* for a man alone there, fear Man is out of scale the forest is too vast, too impersonal too variegated too deeply shadowed Here man needs his fellow man for surance

The rain forest is truly a silent world than the The wind scarcely penetrates not only silent, it is still All then gains a curiously mystery A sudden crack could have made it? An inexpl gurgle A single clear peal—th was a bird, probably a trogon, whistle, impossible to identify mostly silence

The silence sometimes becomes i fectious, I remember sometimes tr ing to blend into this world by co ing along a trail without rustling leaf with my feet or popping a tw But more often I purposely scuff broke noisily through this for where I didn't belong tried to ad vertise my presence both to reas myself and to warn the creature the forest that a stranger was th —I had no desire to surprise a de lance (large venomous serp

Perhaps I am making the f sound too easy too open too ca dral like overdoing my rebel against the idea of jungle It is d cult to give an objective descrip to convey an accurate impressio a landscape like the rain forest w may in one person, arouse awe wonder, and in another, fear *hatred*

I doubt whether the rain fore anywhere easy to penetrate for great distance There are always structions occasional fallen sudden tangled thickets and all stretches of swamps and e less streams

The Forest and The Sea, Random House 457 ... Avenue New York N Y 1960 © by Bates

Sometimes the streams are small, ar, shallow sandy brooks, looking different from the forest brooks New England, and easily negoti ed But sometimes they are broad ers, sometimes they move slug bly over bottomless mud, some nes they are choked with impene ble masses of fantastic vegetation The green hell analogy becomes nd enough in these forest swamps ey are the reason that man has d so little success in making trails roads through the forests why clings to the major rivers either r exploration or trade

ree Major Forests

There are three major areas of pical rain forest the American African and the Indo Malayan ey cover all of the land masses ssed by the equator except the t coast of Africa

The American forest is by far the test and most continuous cover most of the Amazon drainage in tral South America and extend south on the inner side of the des in Bolivia into the drainage of Plata and north in Colombia the drainage of the Orinoco is is hardly separated by the thern most ranges of the Andes n a Pacific strip that follows the t from Ecuador to Panama and continues, in Central America, along the Caribbean coast almost to the line of the Tropic of Cancer in Mexico

There is an isolated stretch of rain forest along the southern coast of Brazil and rain forest once covered much of the West Indies though now there are only scattered remnants

The African rain forest is the smallest of the three and there is considerable debate both about its present limits and its former exten sion It covers essentially, the cen tral drainage of the Congo with a north and west extension along the gulf of Guinea to Liberia

The Indo Malayan rain forest is the most fragmented It covers most of the large islands of the East Indies—Sumatra Borneo Celebes, New Guinea the Philippines—and the Malay peninsula with outlying areas on the west coast of India, in Burma on the coast of Indochina, and along the coast of northern Queensland in Australia

In structure and appearance, the forests of the three areas are very much alike The taller trees reach a height averaging about 150 feet, though individual trees more than 200 feet in height are not uncommon The tallest reported rain forest trees are somewhat less than 300 feet Rain forest trees are thus in general taller than trees in the te perate forests of Europe or N America where the average f trees in the least distur is around 100 feet with exceptional height

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ESTON BATES zoologist author and el r teaches at the University of hi an The di tingui hed author of e of Natural Hi tory Mr Bates' book is *The Forest and the Sea* which this excerpt is con l nsed

But trees in the tropical forest do not reach the gigantic proportions of the California redwoods or the Australian eucalyptuses The tallest measured sequoias reach 364 feet, the tallest eucalyptuses 350 feet

Insect Life

The rain forest crawls with ants of many different kinds occupied with many sorts of business Close associations between particular kinds of plants and particular species of ants are quite frequent

Sometimes the ants clearly serve to protect the plants that provide them with nesting sites in hollow stems One learns to avoid brushing against the trunks or foliage of certain trees like Cecropia with the same care that one learns to avoid poison ivy or poison oak in more northern situations With the ant protected trees the fiery consequences of transgression are immediate as well as painful

The ants are one example of the incredible abundance of insects in the rain forest It is an abundance of kinds rather than of individuals Within a range of about ten miles of our laboratory in Colombia we found 150 different species of mosquitoes (there are only 121 species known from all of the United States and Canada) But you may get more mosquito bites in northern woods than in tropical forests In northern woods the mosquitoes biting you are apt to be all the same kind, while in the rain forest, almost every bite will be from a different of mosquito

The structure of the rain for and the appearance of its inha tants is much the same in Amer Africa and Indonesia, but the th areas have had independent evo tionary histories and are made of quite different kinds of plants a animals

The only animal I can think (besides man) common to all th regions is the leopard which is har ly distinguishable from the jagu of the New World But though the big cats are at home in the ra forest they are far from restrict to it, or to the tropics either

Thus we find great apes in bo the African and Indo-Malayan fo ests gorillas and chimpanzees in t former and orangs and gibbons the latter but no great apes in tro ical America There are monkeys all three regions but the Americ monkeys belong to quite d families from the Old World keys and have had a separate tionary history for a very long ti

Animal Life

Among the rain forest animal there are many survivors from geological past We tend to think marsupials as primitive mamm that have survived and proli in the isolation of the Australia continent except for the commo and tough opossum of North Amer ica But in the tropical rain forest, there are dozens of kinds of marsupials They are not as spec tacular as the kangaroos and their relatives of Australia but they interesting enough

iere is a sleek water opossum
cronectes) living on the margins
e forest streams a bright eyed
ly opossum (Caluromys) with
y, thick fur, and many differ
pecies of tiny mouse like opos
s (Marmosa) as well as several
r genera

he sloths are another archaic
p (and they look it) now con
l to the trees of the American
forest, though in the recent ge
ical past there were also many
ls of ground sloths

; is in the rain forest that jungle
reigns supreme the struggle
xistence nature red in tooth and
Here we find the most fantas

he struggle for existence is sym
ized by the strangling fig which
its out as an epiphyte a seedling

is smothered by the encircling
which then stands alone

nd I can think of nothing more
astatingly fierce more irresist
than a horde of army ants on
move killing and dismembering
ny animal they encounter that
annot fly away or run fast enough

rvivors from the Past

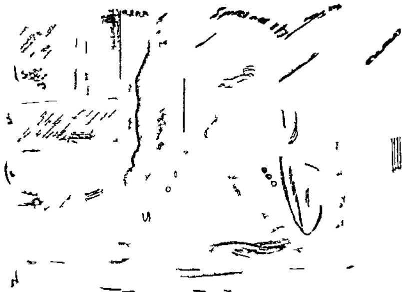
Life then can be grim enough for
e forest inhabitants Only the
ver the carefully protected the
tremely prolific the most modern
em to have any chance of survival Yet, scuttling through the leaves of the forest floor, and nestling in the debris collected around the roots of epiphytes high in the trees, are scores of kinds of cockroaches hardly different in any way that we can see from the fossils of their ancestors that lived three hundred million years ago in the forests of the Carboniferous (early Paleozoic) period

Push over a rotting log and you may very well find a Peripatus a soft brown delicate multilegged caterpillar like thing that, on examination turns out to be a very queer creature indeed

The ancestors of all the land arthropods of the millipedes centipedes spiders insects the first animals to learn to live on land must have been something like this But this anachronism is still getting on very well in the warm damp world of the forest meeting—as far as we can see—unchanged the shifting hazards in hundreds of millions of years of forest life

But with all these reservations and qualifications the rain forest still seems to have more than its fair share of survivors from the past

One can visualize the struggle for survival the competition the strenuousness of life in the rain forest But then in the next instant looking at the multitudinous accumulation of organisms one gets the feel that there is so much warmth so much moisture so much light so much food that almost anything could survive and that almost everything does



After the th rd decade the product on of male hormones gradually d

The Male Menopause

by Harold Shryock M D

Condensed from L fe and Hea

MR WILLIAM T SIMPSON (T stands for Tired) came to the doctor s office and slumped into a chair in the con ultation room The doctor had known Mr S for several years and was surprised that he was feeling ill He was a success ful businessman who had done a good job of rearin his children He had reached his early 50s but just now he appeared older

What seems to be the trouble? ' the doctor asked after exchanging a few pleasantrie

Well Doctor I have no reason to feel sad but it s hard to control my feelings Things bother me than they should I get cross my family and feel irritable I m at work I don't have the I used to have Even though I tired in the evening I have tr sleeping at night Sometimes I h headaches

What bothers me most is th don t think as clearly as I sh and it s hard to remember I ve ways taken good care of my bus affairs but lately the busines been pushing me It s hard fo to take and sometimes I feel d right depressed '

' If you were a woman ' re the doctor I would think you

[illegible] © 1960 by the [illegible] Wash

g through the change of life
urse some men have a com
e experience
u know said Mr S I was
ing to think the same thing
least I don t have hot flashes
ve yourself time commented
octor You may still have
I ll examine you to see
er I have assumed correctly
doctor gave Mr S a careful
al examination and sent a
en of urine to the laboratory
special test to determine how
sex hormone his body was pro

ew days later Mr S returned
doctor s office to hear the out
of his examination
examined you carefully the
began and d d not find any
c disease that could cause you
the way you do The labora
st I ordered was not as conclu
s I wish it were but it suggests
your glands are not producing
ual amount of male hormone
ext thing is to try some syn
hormone to see whether it will
your symptoms
another month Mr S came
to report I am feeling a lot
doctor he sa d but I have
questions I want you to an
Do all men pass through this
ence? You spoke of my glands
being less sex hormone What
s this? If my glands are not

life? Why d d this th ng hit me harder than it hits some other men? Some men remain active and retain their virility until they are 70 or 80 years old What s the matter with me?

As the doctor tilted back in his chair he admitted these ques tions were pertinent He discussed them one at a time

First your question on whether all men pass through an experience like yours It is recognized that the male sex glands reach their peak of activity about the third decade of life Beyond this age there is a grad ual falling off in the production of male hormones But the rate at which the male glands slow down their functions and the suddenness with which this slowdown occurs vary a great deal from one man to another

Many men do not have the marked symptoms you have been having but all men have a progres sive decline in the function of their sex glands In many cases this de cline is so gradual that the symp-toms if they occur at all are not troublesome

Even though the function of the male sex glands tapers off with ad vancing years it usually does not de-cline suddenly As for the reproduc tive function many men have be come fathers after they have passed 70 or 80 years

In the average man the decline in function of the sex organs is gradual that the other organs of body make the necessary adjust without allowing symptoms to

velop In the cases where the de cline of the sex glands occurs more suddenly, symptoms appear that closely resemble those a woman ex periences under the same circum stances" The doctor paused for a moment, then continued

When symptoms occur in men they occur typically at a slightly older age than the age at which the change of life occurs in women Symptoms of the male climacteric usually occur between the ages of 48 and 52 These are average figures In individual cases the symptoms may occur earlier or later

The testes — male sex glands — have two principal funct ons to pro duce sex cells and to produce sex hormones A sex cell is the tiny b o logic unit capable of uniting with a comparable female cell to establish the life of a new individual The male sex hormones are chem cal sub stances that circulate throughout a man s body and stimulate his vari ous tissues in harmony with the gen eral pattern for masculine charac teristics

Mr S did not take his eyes off the doctor s face

Although sex cells and the sex hormones are produced in the same glands they are not necessarily de pendent on each other the physi cian went on ' The male sex glands may continue to produce the male hormone even after the production of sex cells has stopped The pro duct on of male hormone may de cl ne rather sharply without inter fer ng with the production of sex

' It is possible for a come a father even after he through the male climacteric. Th is quite different from the situati that obtains in women for it is n possible for a woman to become mother after her change is comple which is about two years after ce tion of the menses

' One of the normal effects of m hormone in a man s body is to g him the drive courage and agg siveness typical of young manho A sudden reduction in the amoun male hormone subtracts from man s personality the characteri that are typically mascul ne

This change does not affec intellectual capacity but it ten reduce his drive and courage U a man understands this he natu becomes anxious and even appr sive The doctor smiled u stand nly

He worries because he do feel as aggressive as he formerl With reduced drive it is diffic him to maintain his usual pac may feel that he is losing his of business affairs just becau does not prosecute these affa rs his former vigor He may be concerned for fear of losing his culinity He rebels against h forced slowdown

It is being thwarted tha counts for most of the sympto the male climacteric The fu mental remedy consists of help man become reconciled to his c ing station in life It is an able fact that a man cannot young forever He is wise wh

pt this fact gracefully and can ern his activities and attitudes rdingly'

Mr S nodded slowly

THE SYNTHETIC MALE HORMONE often prescribed to help a man th symptoms of the male climac ic is only an adjunct It cannot store his youth it cannot reduce number of birthdays that have ssed What the synthetic hormone es for a man is ease the shock of changing status It tides him er for a few months while he is king the necessary personal ad stments to the slower pace The of synthetic hormone need not d should not be continued for long riods," the doctor said emphati lly

"Well doctor," Mr S responded ou have done a good job of an ering my questions Naturally I ...

... it depends on becoming conciled to acting my age'

"That's right," said the doctor smiling, "but I would not want you to feel for a moment that the best part of life has passed We might say that life consists of three phases — childhood, parenthood and full maturity You are in the transition between parenthood and full maturity Many of the better things of life lie ahead You are in a position to realize the satisfactions and rewards toward which you have worked during the more active period of your life

"Life s greatest treasures such as companionship and the appreciation of cultural and spiritual values will mean more and more to you In spite of slowing down your activities in a sensible way the contribution you are making within your family, your business, and the community will become significant as you continue to build on the advantages you have gained in life"

Strong Plastics Used to Repair Roads

REPAIRS IN CONCRETE California highways are being made with plastics so strong they hold even when the concrete itself breaks

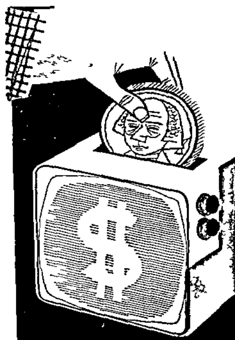
Bailey Tremper supervising materials and research engineer for the California Division of Highways said epoxy resins form strong chemically resistant structures having remarkable adhesive properties A reproduct of chemistry the resins have long crosslinked molecules that provide great strength

Tremper said his division as far as is known first discovered "that epoxy adhesives will form a strong durable bond between fresh plastic concrete and old hardened concrete"

• • •

He said California installatio proved the durability of the areas of mild weather

Have Coins Ready—



Pay-TV's Coming!

by Hal Morris

PAY TELEVISION, caught in a log jam of pros and cons plus technical difficulties appears to be making a breakthrough after more than a decade of planning and occasional tests

If all goes well the current citizens' reception of toll television in the Toronto Canada, suburb of Etobicoke will spread to such places as Hartford Connecticut Rego Park Long Island New York and resume at Bartlesville Oklahoma, year s end

In addition, there s growing interest for subscription television other areas — Texas, Pennsylvania Wisconsin, Florida and Michigan

Its leading proponents claim television has arrived and nothing can stop its progress

Motion pictures not available on regular TV, stage shows operas ballets, recitals symphonies and sporting events are among pay TV's planned offerings

Aside from certain personal and economic benefits pay TV s current revival undoubtedly is boosted by charges of quiz show rigging payola the mediocrity of many free TV programs with too much emphasis on crime and western shows, plus irritating commercials

What are the features lifting pay TV?

Comments from Etobicoke ...

ing a first run motion picture without having to stay up for the late hour movie shows on free televi...

2 Clarity of the picture good reception and absence of commercials are lauded Superior pictures achieved by using larger projectors than those commonly used by television stations Land line reception contains no atmospheric interference on the audio or video end no 'snow' or ghosts

3 Most families find pay TV a pleasant and economical solution viewing a top feature at a low price—and without a baby sitter fee

he Etobicoke operation is backed companies connected with the ie industry Paramount Pictures rp through its wholly owned TV subsidiary, International emeter Corp franchised Famous yers Canadian Corp Ltd Can s biggest theater chain Famous yers is half owned by Paramount same movies seen in Famous yers owned theate in Etobicoke viewed on pay TV there

ilms are secured by the pay TV ich se holder on the same basis novies to theaters—on a percent deal

he Canadian toll television set unlike previous U S tryouts is nanent stresses president Louis Novins of Telemeter which ted pay TV development in 1950 r digesting the idea for a year tobicoke is considered an ideal ing ground There s plenty of petition from free TV Resi s can receive five stations in ng two affiliates of U S net s

lemeter s Etobicoke operations 3 500 subscribers signed by mid with 5 000 to 6 000 expected une 1 The 93 mile long cable by 13 000 homes Telemeter to lay cable in an adjoining Toronto area which would pay TV available to 40 000 ional homes

Morris, a *Los Angeles Mirror* staller specializes in articles dealing the technical and business end of business

In the first month of Etobicoke operations this year, Telemeter piped out 19 first run movies that were screened 140 times four hockey games one boxing match and several movie shows for children

Telemeter figures 75 percent of the viewing hours eventually will feature movies 15 percent sports and 10 percent opera ballet and theater

Plan Long Island Test

Reintroduction of Telemeter in the U S (it was tested in Palm Springs California in 1953) will be on a larger scale than the Canadian operation While the Etobicoke debut was made in about 1 000 homes, it is planned to wire between 10 000 and 20 000 homes initially in Rego Park Long Island New York

Within a half mile area surveyed in Rego Park reports Telemeter s Paul MacNamara there are 20 000 TV sets We re aiming to hook up half that number It would be easy to grow TV sets in apartment houses are connected to a master antenna All we d do is tap the master and we re in business

Meanwhile Zenith Radio Corp and RKO General Inc have teamed and plan a three-year trial run of Zenith s over the air Phonevision system in Hartford Connecticut

Zenith made a limited test of pay TV in 300 Chicago homes nin years ago

While stringing wires to homes—as with Telemete consuming the Phones could come into 3

served by station WHCT (Channel 18) Hartford, without need of cable

Extensive field tests, Zenith says, have been completed on a decoder that unscrambles transmitted sound and picture A simple device, the size of a table model radio, the de coder is attached to the subscriber's TV receiver

The Hartford trial run will seek to prove stations not affiliated with networks can operate profitably if they are permitted to engage in sub scription programming

Several other pay TV methods, dormant for a few years also may spring to life again—Blonder Tongue Laboratories Inc Tele globe Pay TV System Inc and Skia tron Electronics & Television Corp

Zenith and Skiatron favor wireless rather than cable TV such as Tele meter But all three claim they can adapt their systems to either wired or over the air methods



Coaxial cables are expensive to in stall and cost of each Telemeter box, manufactured by Guardian Electric Co Chicago is slightly over $60 for the Etobicoke operation where 100 to 125 are installed every day U S systems will use newer models that will carry lower price tags of about $50

Under Zenith s proposed Phone vision setup in Hartford via station WHCT, a few evening hours each would be devoted to subscrip tion service, other programs throu the station would be regular free Each month the subscriber will ge program guide of pay TV sho mostly major box office attractio not seen on regular TV

Flip a Switch

To see a Phonevision program pay viewer flips a switch on the coder mounted on the TV set. electronic tape keeps a record what is viewed for monthly bill However, the sub criber can pay as he sees by putting coin slot on the decoder

In the Telemeter wired syst signals for three different progr leave a main studio on a single cable As a signal passes along cable route it is amplified at var points to compensate for loss strength the result of cable re ance Booster amplifiers insta atop utility poles restore the s to peak performance

Feeder lines attached to ut poles fan out through reside areas and individual homes linked to the system via drop along the way

A drop off connection is cla to the feeder cable outside dwelling Circuit elements w the tap off unit isolate signals re ing the house so there is no p bility of interference between sub criber s pro rams and anot

The drop off wire is connecte a wall plate similar to those by utility companies when install telephone or electric lines then tached in 10 minutes to the T

un t through an external con n to antenna terminals on the of the T\ set

lemeter asks a $5 installation r its co n boxes Program costs from a nickel to $2 Boxes ed n ckels dimes quarters and ollars In case of overpayment t storage indicator automati provides a piggy bank for e p ogram payments

t l a subscriber pays for a pro tuned his TV screen remains Upon payment of the coin nd the program appears As Phonevision a tape recording at cally identifies all programs ased This recording is col along with the cash every 30 days by a system representa The collector also provides tenance

of System

hat are the costs of a pay TV em? What is needed to set it up? Wired versions studio equip it is obtainable from several ufacturers Price varies depend on many factors including ce of either 16 millimeter or 35 meter projectors

asically a studio providing two ltaneous film programs utilizing mm projectors and including pment for originating one live ram plus gear to feed programs a remote point costs $56 000 distribution system including a cable installation and feeder covering residential areas as as drop-offs (connections from cable outs de dwellings) to 5 000 homes under normal circum stances is estimated at $200 000

The Telemeter box attachments at $60 each a ld $300 000 more for 5 000 subscribers

Thus basic cost for a 5 000 unit service of pay T\ via cable comes to $556 000 In addition there are housing and land costs for the studio



The over the air method neces sitates buying or teaming up with an existing T\ station Service tech nicians and installation of decoders are other ch ef expenses

Subscribers method of payment is important The September 4 1957 to June 6 1958 cable T\ test at Bartlesville Oklahoma by Video Independent Theatres Inc flopped in part because of a flat charge initi ally of $9 50 a month for 13 first run movie and 17 not so recent fea tures Later the monthly rate was sliced to $4 95 and showings were curtailed as subscribers dwindled

But Bartlesville toll TV opera tions are far from dead About 800 homes remain wired for pay T\ in the community of 8 000 TV set own ers Video Independent Theatres president Henry Griffing already has plans to resume pay TV this time using the Telemeter pay as you see system He figures Telemeter s cash method will solve problems he en countered in the earlier trial

More than 500 U.S commu hemmed in by mountains terrain factors receive T\

community antenna systems Each is a potential pay TV area

But final success of pay TV won't be without hurdles An entertainment world war is possible

There is an abundance of pressure and anti pay TV talk from theater operators television networks and other groups

The networks claim pay TV will engulf competing forms of entertainment, luring away the customers and talent—and at prime evening viewing hours The public would be robbed of free air waves they say

The National Association of Radio and Television Broadcasters terms pay TV "a promoter s dream which could become a public nightmare

National Broadcasting Co chairman Robert W Sarnoff stated If pay TV progressively siphoned off our key attractions we would lose or only means of holding a mass ...e Advertising effectiveness ...integrate revenues would ...y shrink The develop ...programs the continu... public service pro...

Coaxial cables are made television stall and cost of e e in American life manufactured by Ch untenable'

mount Theaters, Inc television would "eventually the destruction of free tel... He adds "Nor is there any that pay television programs not carry advertising'

On this point Golden on sensitive spot with pay TV ers most talk of pay TV as the dium without commercials provisions for sponsored pr...

No Commercials?

Telemeter, in a brochure a... attracting pay TV operat... several features suitable for ship by local business co... news weather and time

Strongly against toll TV Theater Owners of America Harling assistant to the p... declares if pay TV were ever on a broad scale in this country erally thousands of theaters be put out of business before TV itself was proved uneconom...

Such are the forces for against subscription television

Survival or doom of pay this changing social and eco... world rests wi... and Householder ...e

un t through an external con
n to antenna terminals on the
of the TV set
emeter asks a $5 installation
r its co n boxes Program costs
from a nickel to $? Boxes
d n ckels dimes quarters and
ollars In case of overpayment
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til a sub criber pays for a pro-
tuned his TV screen remains
Upon payment of the coin
d the program appears As
oney is on a tape recording
atically identifies all programs
sed This recording is col
along with the cash every 30
days by a system representa
The collector also provides
nance

System

are the costs of a pay TV
What is needed to set it up?
red versions studio equip
s obtainable from several
cturers Price varies depend
many factors including
either 16 millimeter or 35
er projectors
lly a studio providing two
eous film programs utilizing
projectors and incl
nt for originating on
plus gear to feed pr
emote point costs $
ribution system ir
ble installation a
ering residential areas a
drop-offs (connections fro
able outs de dwell ngs)

5 000 homes under normal circum stances is estimated at $200 000

The Telemeter box attachments at $60 each a 1 $300 000 more for 5 000 subscribers

Thus basic cost for a 5 000 unit service of pay TV via cable comes to $556 000 In a ld tion there are housing and land costs for the studio

The over the air method neces sitates buying or teaming up with an existing TV station Service tech nicians and installation of decoders are other chief expenses

Subscribers method of payment is important The September 4 1957 to June 6 1958 cable TV test at Bartlesville Oklahoma by Video Independent Theatres Inc flopped in part, because of a flat charge initi ally of $9 50 a month for 13 first run movie and 17 not so recent tures Later the monthly sliced to $4 95 and show curtailed as subscribers

But Bartlesville to tions are far from de homes remain wired bases for these dis the community of 8 ctions? To answer

ll have the stom ptacle for pills ear our I Q is ite of one point d that we will be imbeciles

this question we must first under stand the causes of the evolution in any plant or animal Biological sci entists have a widely accepted we founded theory concerning the anisms of evolution in the bio world called the theory of selection It was first years ago by Charles Darw Natural selection is

sifting or culling process acting continuously on plant and animal populations. It depends on the simple fact that all such populations contain a wide variety of individual types. If a species finds itself faced with a changing environment which makes new demands, some of these individuals will be better able than others to meet the new circumstances.

These individuals, having survived in greater numbers, reproduce the particular characteristics that gave them their advantage. Their offspring, in turn, will have the same advantage over their contemporaries and will contribute an even greater proportional share of these advantages to the succeeding generation. The net effect is a gradual change in the composition of the entire population.

This phenomenon might be called adaptive adjustment. It might appear that such a process could not produce such dramatic evolutionary changes as "from fish to philosopher," as Homer Smith put it, but it does appear that one adaptive adjustment can open the door to another. And operating over millions of generations and hundreds of such adjustments, there is no limit to the change which might be brought forth. For example, let us make a somewhat hypothetical reconstruction of one of the critical phases of man's evolutionary history.

Two of the most important changes in human evolution were (1) the change involved in becoming an erect bipedal ground walking animal and (2) enormous brain development. To reconstruct the fi[rst] of these, let us look at man's tre[e] dwelling ancestor living in hea[vily] forested regions 10 to 15 milli[on] years ago. Climate was undergo[ing] an extremely slow change towa[rd] aridity and the forest was slow[ly] giving away to grasslands.

With the trees disappearing, the animals were faced with the prob[lem] of surviving on the ground. [At] first it was merely a matter of ge[t]ting from one patch of forest to a[n]other. Gradually the need for fo[od] forced them to the ground and ba[l]anced somewhat precariously on th[eir] feet, they moved awkwardly b[e]tween trees, often scrambling aft[er] rodents for dinner. Some of the individuals were endowed with min[or] anatomical characteristics of bo[ne] joint and muscle which allowed the[m] to move about more easily th[an] others.

By being able to move faster, [to] escape the saber toothed tig[er] and to catch more food, these ind[i]viduals had a slight statistical a[d]vantage over their fellows in th[e] game of survival. More of them l[ived] to reproduce. Consequently, the[y] contributed more than their share t[o] following generations.

This went on generation after generation, slowly producing a change in the entire population. Tens of thousands of generations of cont[inu]ual selection finally produced a bipedal ground dwelling animal with

[illegible]

ely longer legs, shorter arms, k and hips remodeled so he stand relaxed and well bal and flat, remodeled feet on to stand

ing demonstrated the concept ural selection, let s re examine predictions as to the future of For instance, will man lose his Some individuals are born it ears but is it likely that have a greater chance of sur and reproducing than people ears? Are toeless babies more to grow up and reproduce than en born with toes?

Darwinian predictions such se are based on various mis tions of the mechanisms of ion For instance the predic hat man s muscle will wither comes from the old theory that teristics acquired during the an individual become heredi and are passed along to his ty for example if a man does e his muscles and they wither his son will be born with with uscles Lamarckianism as this is called, has been for some ompletely discarded

ther misconception concerns tion of a "perfecting princi n evolution Anthropologists he remodeling of man s skull ed in the expansion of his brain caused a shortening of the jaw, which in turn accounts for our pres ent day wisdom tooth trouble

Some have suggested that evolu tion will take care of this problem by removing the wisdom teeth entirely This probably stems from an old idea that evolutionary process is some sort of change toward perfec tion"

Actually the achievement of effi ciency and balance has been a matter of survival rather than evolution of the perfect for the sake of perfection

The matter of wisdom teeth serves to illustrate the new relationship man has established with his en vironment Under primitive condi tions an infected wisdom tooth was often a matter of life or death and it is quite possible that we were on the way to losing them by natural selection Now however with both penicillin and dentists the infected tooth is no longer so important and the dentist by removing it also re moves the force of selection

ture the environment of modern civilization is completely different from the environment in which al most all the man's past evolution took place—the five to ten million years before the dawn of civilization

ALL ANATOMICAL DETAILS which separate man from the gre apes were shaped and molded b selective forces of his prim vironment Such matters to run or hurl a spear,

mr Timothy Prout is assistant r of zoology at the University of r a s Riverside branch This article ondensation of a popular lecture by Dr Prout

stalking wild animals, ingenuity in fashioning spear heads were of great importance to survival

Modern civilization, by comparison, may be looked upon as a protective cloak thrown around most of mankind, removing it for the most part from the particular selective forces of primitive life

Let us next consider the effects of the relation of selection which the new environment has brought about Some have suggested that because of this relaxation man as a species will go soft and deleterious traits will spread throughout our population But the Hardy Weinberg law stating the fundamental principle of population genetics indicates otherwise

This law says that a trait which is neither advantageous nor disadvantageous to its possessor—neutral in a Darwinian sense—will neither increase nor decrease in incidence from one generation to the next In other words if we consider the descendants of normal people beside the descendants of a feeble minded individual we find that the whole population is growing but the ratio of feeble-minded to normal has not changed at all

The question then is has man s new environment of civilization brought with it new selective forces? To answer this question we need to know what physical and mental characteristics have the highest combined survival and reproductive rates? Next we have to know to what extent such traits are heredi . Finally we have to know the

persistence of their selective adv tage Such information might us an idea of where man is going

Unfortunately, of all the su made by sociologists, anthr gists, politicians and the tooth and cigarette people, none gives the information we need Still is one trait which has been anal in terms which are useful and th intelligence as measured by the known I Q test

Intelligence is one of those in esting and confusing traits where influences of hereditary and env mental differences between i uals are about equally impo There are hereditary tendencies high and low intelligence but the tent to which these are expressed pends to a great extent on such tors as family environment schooling

There are those however say the average I Q of the ulation is dropping because There are small average differ in I Q between different soci nomic levels and (2) Lower economic groups tend to have l families

There are a number of fa which may be working against an effect

First of all the inverse relat ship of I Q to reproductive ra a recent phenomenon not unive and some sociologists, believ shortlived

Second people with a high b rate al o have a high mortality r

Thirdly, and most important ural selection can only operate

tant differences since it de on the multiplication of par traits in the offspring Hered mittedly plays a part in deter g intelligence but it does not that if two groups differ in e I Q they differ because of tary endowments

s probable that *total* I Q dif es between lower and higher n c groups are due principally ily environment and school d that average hereditary en nts found in different socio nic groups are the same If so as seems likely the differ reproductive rates will have no whatsoever on the changing composition of succeeding tions with respect to I Q

ing back to the initial ques as evolution stopped it can be hat man s new environment in the biological world has completely erased the selec rces that act on other animals o the complexity and novelty environment in the biological it is impossible to guess what t new selective forces it has ht with it

pite my inability to make a le prognostication I would like ke a broad generaliz ition We already noted the protective e of man s new environment he fact that he can live quite ssfully on the South Pole at quator in the jungle on the beside the sea and for short ls even in the air or under In each case he uses his in and knowledge to protect himself from these variations in en vironment

To me this means that if man is subjected to a new environment in the future (the usual stimulus for evolutionary change) he will use his knowledge and ingenuity to adapt to it rather than undergo bodily evolu tionary changes through the process of natural selection To put it crudely if the world grew cold (say we entered an ice age) man would put on a fur coat rather than evolve one Thus the man inside the coat would remain the same

Forced to make a prediction I would say man has reached an en vironmental relationship tending to produce evolutionary conservatism

Evolutionary conservatism and even stagnation are not without precedent in the biological world The opossum has remained essen tially unchanged for the last 80 mil lion years while changes were taking place in his mammalian relatives At the beginning of that period he was a novelty on the scene and had a history of rapid and radical evolu tionary changes

MAN ALSO IS a novelty on the scene with a history of evolu tionary change behind him It may well be that like the opossum, he is entering a phase of evolutionary sta bility due to the special relationship he has established with his civilized environment

So if I were forced to a the question '*Has man s* stopped? ' I might say, " possibly it has "



CLOUD OF CO[M]
SURROUNDS

THE SUN is surrounded by a large *cloud of comets most of them at such* vast distances they are invisible from the earth

These comets may have been formed at the same time as other members of the sun s system from the original gaseous cloud and with further growth might have become asteroids or even planets

Comets have very low temperatures They are believed to be composed of icy mixtures of frozen matter Even when comets approach relatively close to the sun they remain … Their temperatures then reach about 190 degrees below zero … heit due to the cooling effect … comet s volatile gases are rel… solar heating Dr Bertram Do… Wayne State University Detro… calculated

• • •

Because comets are so cold th… out their lifetimes they probably not undergone any extensive changes since their formation fr… original solar nebula

EXPERIMENTS CONFIRM
EINSTEIN'S PRINCIPLE



EINSTEIN'S PRINCIPLE of equivalence *is true for electromagnetic waves such* as radio and light two physicists at Harvard University have found

The equivalence principle is one of the basic assumptions of Finstein s general theory of relativity It states that no detectable difference exists between the force of gravity and the force produced by acceleration outside a gravitational field

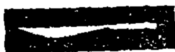
Earlier experiments have proved the equivalence principle for material bodies but only recently has the effect of gravity on light radio waves and gamma rays been detected in the laboratory If gravity and acceleration are equivalent Einstein concluded that a … tational field should lower the frequency of light rays escaping … gravitational field

This effect called the grav… red shift had not been concl… measured until recently Now Robert V Pound and Glen A … Jr have measured the change … quency of gamma rays as th… moved up and down through a … column They found that gravity … the frequency of the falling … rays and lowered the frequency … rays rising up the column ag… force of gravity

Their measurements of the g… tional red shift averaged 105 p… the value predicted by Finste… an experimental uncertainty … percent



Harvey Cushing



master brain surgeon

by Cedr c A Larson

EW NAMES *in the* history of American *medicine* outshine that Harvey Cushing *pioneer* brain ial st and *genius* of brain sur

e was at *once a f*amed master eon the foremost *neurologist* of t me discoverer of many new ological *facts* critical investi r *noted* physician capable hos l administrator inspiring teach med cal *bibliophile* and histor artist and man of letters

le perf*ormed h*undreds of opera s where a single error might have ught *immedi*ate death His mon ental *two volume Life of Sir* l am Osler won the Pulitzer Prize 1926 *At* the time of his death in 9 he *held 23* honorary degrees owsh ps of various kinds and nberships *in* most of the medical et es of the world

his *career* spanned four and a f decades of brilliant work in the d cal *laborator*y in the med cal rary on the front line battle- ds *of* World War I in the con ation off ce in the hospital wards d *in the* operating room

Before Harvey Cushing brain surgery had been a more or less hit or miss affair He made it into a well defined science and created a new technique of brain surgery He took many a hopeless case and through brilliant diagnosis and su perb surgical skill restored the suf ferer to a life of useful activity and health

• • •

Harvey Cushing was born in Cleveland Ohio on April 8 1869 He was a descendant of Puritan set tlers who had come to New England in 1638 His great grandfather grandfather and father were all doctors

From school in Cleveland Harvey went to Yale University He received his A B degree in 1891 and then en tered the Harvard Medical School He was awarded an M D cum laude in 1895 After graduation he went to Johns Hopkins Hospital to work under the noted surgeon William S Halsted (1852 1922) Dr Halsted proved to be one of the shap influences of Cushing s sub career

The Johns Hopkins prof famed for the discovery

blocking or regional anesthesia and the development of an operating technique, which consisted of thorough cleanliness, deliberate action at each step, careful handling of the tissues, and complete control of hemorrhage Halsted also introduced the use of rubber gloves by surgeons and their assistants

Halsted was in fact one of the 'Big Four who so capably developed Johns Hopkins Hospital and Johns Hopkins University, the other three being Sir William Osler, William H Welch and Howard A Kelly It is most significant that young Cushing studied for years under two of these Halsted and Osler And it is doubtful if either Halsted or Osler had any other pupil who mastered so thoroughly and completely the art of surgery

Skilled as Medical Artist

His training as a general surgeon completed Dr Cushing went abroad (1900-1901) Several months in Berne Switzerland, in Hugo Kronecker s laboratory, making experimental investigations of the effects of increased intracranial tension on arterial blood pressure, were followed

Cedric A Larson teaches in the Department of Psychology University College Rutgers — the State University Newark [illegible]

by a period of study with Cha[illegible] Sherrington in Liverpool on brains of anthropoid apes Skille[illegible] an artist, Cushing made beautif[illegible] executed drawings of the to[illegible] of the cerebral surface, a practic[illegible] was to pursue in all his later records

On a visit to Pavia, *Italy*, C[illegible] ing picked up a clinical mode[illegible] S Riva Rocci's new blood pr[illegible] apparatus with inflatable ar[illegible] which he adapted for use in all subsequent surgical work

After his return from E[illegible] Cushing was made the neurosu[illegible] of the Johns Hopkins H[illegible] group Soon he had establish[illegible] laboratory for animal experime[illegible] tion connected with the Depart[illegible] of Surgery and named after the [illegible] neering English surgeon John H[illegible] ter The Hunterian Laborato[illegible] Here Cushing trained young me[illegible] graduates in comparative sur[illegible] and in cooperation with his stu[illegible] he worked at experimental res[illegible] programs

For many years Cushing and associates investigated the pitu[illegible] body The most important of endocrine glands associated dir[illegible] with physical development is pituitary, a small structure atta[illegible] to the underside of the brain located right in the center of head It performs the double fu[illegible] tion of controlling growth and stimulating other endocrine gla[illegible] through its "middleman hor[illegible]

Particularly vital to normal bo[illegible] development during childhood is pituitary growth hormone [illegible]

...ols the growth of the skeleton ...les and various internal organs ...oper functioning of the pitui... gland in producing this hor... may result in such abnormal ...ons as dwarfism gigantism or ...negaly (overgrowth of certain ...s of the skeleton such as arms ...s jawbone) Dr Cushing s ...book *The Pituitary Body and ...sorders* a work of 341 pages ...shed by Lippincott appeared ...12

...ring the period 1901 05 Cush... became great friends with the ...d Dr William Osler Osler a ...cal graduate of McGill Univer... (1872) had served as professor ...n cal medicine at the University

... ty Here Osler carried out orig... and valuable researches on the ...ses of the spleen and blood and ...eminent contributions to the ...of the heart condition angina ...ris, and many other maladies ...hing lived next door to Osler the men were inseparable com...ons In Osler s home he met ...eminent medical men from all ...the world In 1905 Osler was

...e separated the two their ...dship was lifelong and a lively ...ondence was maintained ...ch was terminated only by ...r s death

...rior to Cushing s time it had ...n customary for brain operations to be handled rather crudely A neurologist would study patients with cerebral symptoms recommend an operation and direct the hands of the operator This method was re garded by Cushing as anomalous and even dangerous for the mortal ity was high To correct the situa tion he became an accomplished neurologist

Technique for Brain Operations

He insisted that the neurological surgeon should be personally able independently to make a meticu lous examination of the nervous sys tem diagnose and localize a disorder and be responsible for each phase of the operation

Cushing s technique for brain operations was based on meticulous care in the handling of tissues the use of layers of fine silk in closing the wound the employment of small



cotton compresses to reduce bleed ing and the avoidance of shock to the patient He kept a running rec ord of blood pressure closely observ ing it for any changes

Fatalities were greatly reduced and Cushing s methods became standard procedure in American hospitals

Cushing was among the first phy sicians to call attention (1897) to the importance of X rays for ob taining exact knowledge of ... terior of the body

On June 10th 190... C... ried Katherine Stone

Cleveland They subsequently had five children

In 1910, Cushing was simultaneously appointed professor of surgery at Harvard Medical School and surgeon in chief at the new Peter Bent Brigham Hospital

His work at the hospital and the peak of his development in neurosurgery, went on until the outbreak of World War I At first he kept his interest in the general surgical clinic but his prominence in neurosurgery was so exceptional that gradually this field absorbed all his time and energy His specialty was brain surgery One operation a day was normal for him in peacetime but during the war a few years later he performed as many as eight

• As a physician in the Brigham Hospital, he was a quick and penetrating observer also noted for the warmth and cordiality of his bedside manner He would visit scores of patients take a genuine interest in their health and comfort and give them words of encouragement and cheer He insisted upon complete case records for each patient

• As a professor who taught surgery, Cushing liked what he called the apprentice or 'Hippocratic system of teaching students at the bedside In his wholehearted support of this method of teaching he went so far as to advocate that instead of requiring courses in the medical sciences as preliminary to clinical experience the wards should be thrown open to students from the [illegible]set of the medical curriculum

[illegible]e onset of World War I opened a new and exciting chapter in th[illegible] of Harvey Cushing Never a m[illegible] sit on the sidelines he saw the[illegible] on the Western Front at close [illegible] ters His first duty was in the spring of 1915, some nine m[illegible] after the outbreak of that co[illegible] when he served with a Harvard [illegible] in the American Ambulanc[illegible] Neuilly, France At that time h[illegible] came familiar with the French [illegible] ice de Sante On a tour of Fla[illegible] he saw first hand the work [illegible] Royal Army Medical Corps

He returned to America a[illegible] part of the preparedness cam[illegible] and as a reserve medical offic[illegible] tackled the task of organizin[illegible] of the Base Hospital Units [illegible] were recruited from the profes[illegible] staff of a number of university [illegible] cal schools As head of one of [illegible] units known as Base Hospital [illegible] —the second military organi[illegible] of any kind officially sent over[illegible] he sailed for France in May [illegible]

On the Western Front

Throughout 1917 he served [illegible] operating surgeon with the [illegible] forces and was detached fro[illegible] unit for special duty during th[illegible] tles for the Messines and Pas[illegible] chaele ridges In June 1918 h[illegible] transferred to the Medical [illegible] quarters staff of the America[illegible] peditionary Forces as senior co[illegible] ant in neurosurgery and partic[illegible] in three major engagemen[illegible] Chateau Thierry, St Mihiel [illegible] the Argonne He operated on [illegible] cal cases for periods [illegible] long as 16 hours at a stretch



1869—Harvey Cushing—1939

oughout the war Cushing kept
journal of his experiences
itudes The best portions
ghts were taken from this
l and published in a 534
in 1936, which bore the
A Surgeon's Journal
1918 at Chateau Thierry he
so hard he came down with
itis, temporarily lost the
of his fingers and could
alk easily again He regained
of his hands and returned to
however, as a result of the
of wartime strains he was
sufferer from arterial disease
remainder of his life
all through this period of
physical exertions his publica
continued His contributions
care of intracranial war-
set the proper methods in
ield For his great contribu
was honored by the United
with the award of a Distinguished Service Medal, by Great Britain with the Order of the Companion of the Bath and by France with the Officer of the Legion of Honor He attained the rank of colonel in the U S Army

During the war there were several trips to England and each time he managed to visit his old friend Osler He was greatly moved with sympathy by the tragic death of Osler s son Revere, who was killed in the war Osler had received many honors in England and had been knighted

Won Pulitzer Prize

After the war he returned to Boston and resumed his labors in neurosurgery He soon found himself as busy as ever and surrounded by a staff of capable assistants the midst of all this Sir Osler died, and at the req Lady Osler he undertook

of a biography. It was a labor of love, but it consumed almost five years of his spare time—evenings, week-ends and summers

Eventually the great two-volume biography appeared with the imprint of the Oxford University Press in 1925 Volume I totaled 685 pages, and Volume II, 728 pages, and both contained many photographs The monumental biography was written with great felicity of expression, charm and style and was awarded the Pulitzer Prize in biography for 1926



might be regarded in the primary source materials in ...cine, particularly as they ... to the nervous system ... during this golden period of ...tivity Besides these books he ...lished some 150 papers and ... during this period

Cushing was the first to ... high frequency currents in ...logical surgery He consulted Dr W T Bovie a physicist ... had developed two separate frequency currents to a ... cancerous growths one ... cut tissue without bleeding ... other to coagulate a vein the ... be severed or a vessel already ... and bleeding

uch confidence of success
ominal surgeon who enters
en to remove an appendix
:hologists who believe that
nty of most men reaches
r the age of 40 and virtu
ıes by 50 or at the most
fact of considerable sig
hat one of Cushing s most
ld valued single contribu
inical medicine was made
l year as he was about to

it years of Cushing s life
ted to study of the pitui
d Among his pituitary
e had observed a special
h a condition which had
what loosely called poly
syndrome'
ame convinced that this
(group of symptoms) was
bout by an increase in the
cells of the pituitary He
permission to perform
ps es on persons who had
d to this disease entity
heory was confirmed He
name of pituitary basoph
this syndrome and an
his discoveries concerning
hil tumors in New York
vard and at Yale in the
1932
's deductions concerning
basophilism were hailed in
ircles as a great discovery
was subsequently named
s disease in his honor He
nly discovered an entirely
se but had thoroughly de
an l hed its course
pment

He gave up surgery but remained at the hospital for another year, doing research work on the brain

Professor at Yale

The following year Cushing went to Yale as the Sterling Professor of Neurology (1933 1937) This was an active post and not simply an honorary sinecure He took with him his collection of brain tumor specimens and photostatic copies of patients records and continued the study of this great mass of material the source of many articles and some books

Though the Yale professorship terminated in 1937 Cushing s work continued unabated In 1937 he became professor emeritus and re ceived the title of Director of Studies in the History of Medicine at Yale He published his great volume on the meningiomas (tumors of the brain and nervous system) in 1938



On the occasion of his 70th birth day Cushing s publications were listed in book form and published for a birthday celebration on April 8 1939 by the Harvey Cushing Society a group of young
gists who had studied under
ing Honors had come
fusely in his last
is 1938 he had
to receive the de
ence honors

Cushing was stricken with a coronary condition in early October 1939 He was admitted to the hospital, and died early on the morning of October 7th The world had lost perhaps the foremost physician and surgeon produced by America

• • •

Cushing once wrote "Rarely is it safe to prophesy any durability of recognition, whatsoever the accomplishment Fame that is contemporary, fame that for a time endures, and fame that actually accumula differ in quality as differ the fl of a meteor, the glow of a comet permanence of a fixed star when the contemplation of both man and his achievement truly spires and ennobles us will they main indivisible to be praised by people for time everlasting"

Today, 21 years after the pas of Harvey Cushing, his career work seem destined to fit into last named category.

Children Hardest Hit by Fallout

CHILDREN NOW FIVE and six years old will get the greatest doses of radioactive strontium 90 and cesium 137 already in the air from nuclear weapons tests Dr Wright H Langham of the Los Alamos Scientific Laboratory has reported

This is because they will be in their period of greatest growth—and consequently uptake of bone and muscle building materials—during the time of greatest fallout he explained

The biochemist calculated that the world average strontium 90 bone and bone marrow doses for today's children as a result of bomb tests to date would be 10 percent as high as *those* received from natural background radiation The cesium 137 bone and bone marrow doses he added would be 5 percent of natural background Strontium 90 can cause leukemia so-called cancer of the blood

Doctor Langham said he was not assessing the potential hazards to the population if any of the e[illegible]

So far as genetic changes are concerned Dr Langham said that children before they reach 30, most people are through having dren would receive doses of cesiu in their germ plasm of between l 2 percent of the dose from t background

Nuclear weapons tests not co the recent French explosions hav duced between nine and ten curies (*a* measure of radiatio strontium 90 and between 16 an million curies of cesium 137 Dr ham *estimated*

Of these amounts about *1/3* f earth close to the test sites a *1/3* has already fallen to earth all the world and the other 1/3 is s in a stratospheric reservoir wh leaking down on us all the time

Doctor Langham said the U States and the Soviet Union could have planned the location of their sites any better if what they w was to hit the greatest population centrations of the earth with mo the long range fall out

Ten or more major earthquakes occur annually

When The Earth Shakes

by William L Laurence

Condensed from New York Times

EN OR MORE major earthquakes shake the earth every year The largest of them releases about a thousand times more energy than an atomic bomb of the type that destroyed Hiroshima and Nagasaki

The earthquake in Assam, India August 15 1950, the second largest earthquake on record ...

Although destructive earthquakes are relatively few in number small ones are common ...

The crust of the earth is constantly being remolded as the result of titantic forces everlastingly at work shaping the rocks of which the crust consists

Dr Arthur Beiser of New York ... states in his recent volume *Our Earth*, "most evidence ... to sudden movements of solid ... along faults in the earth s surface ... the cause of earthquakes'

... faults' Dr Beiser states, ... scars of earlier fractures in the crust which occurred when the stresses within the earth become too great for the rock to support

'An additional stress if large enough may cause a further slippage and this slippage in turn sends out shock waves which may be felt over thousands of square miles in the case of a major earthquake

'As far as the earth s interior is concerned an earthquake is like a vast explosion which sends out vibrations everywhere

These vibrations are transmitted through the earth as a series of tremors or waves which are recorded on distant seismographs

The duration of a shock at the focus or site or the disturbance as well as directly above the focus, at what is known as the epicenter may occupy only a few seconds or minutes but the transmission of the waves may take many hours

Maps showing the location of epicenters indicates that most earthquakes occur at sea There are two prominent earthquake belts, around the shores of the ... Ocean the other running about the earth through ... terranean region

NEXT MONTH IN SCIENCE DIGEST



ODORS AND YOUR EMOTIONS
Odors play a dominant part in the l ves of an mals and an important part in the l ves of men Ant cipat ng odoriferous movies by 2 000 years Nero used a system of s lver p pes to waft perfumes over d n ner guests H stor cal s del ghts on odors emotions



ELECTRONICS WITHOUT ELECTRICITY
A block of metal or plastic with holes in it is making complex and sens t ve dev ces simpler cheaper and more rel able Th s is PFA—pure flu d ampl f er—wh ch involves no mov ng parts



6 REASONS WHY MEN STEAL
Steal ng is an ugly word says the wr ter who is head of the department of psychol ogy of a lead ng univers ty but it appears to be an unden able fact that steal ng is a deeply ingra ned propensity in human nature Th s art cle tells you why



and many other provocat ve informat ve art cles about what th s chang ng world means to you

They coincide in a general way with the two volcanic zones, but they are not regarded as necessarily connected except that both the volcanic and earthquake belts follow closely young mountain systems on land and the depressed troughs at sea Both are thus connected with comparatively recent geologic disturbances in the earth's crust

The earthquake and tidal wave that crushed Agadir, Morocco, last March, taking a toll of thousands lives, registered as just an ordina quake on the seismographs of Lamont Geological Observatory Columbia University

THESE INSTRUMENTS rooted the rocks of the Palisades cord 200 like it every year quake however, was remarkable that it occurred in a region in wh heavy earthquakes are virtually known

However on September 9, 19 there was a severe quake at Orl ville in northern Algeria, at the posite end of the Atlas Moun from Agadir It killed 1 400 The Moroccan tremors were at uted to faulting or fracturing in Atlas range

Maurice Ewing, director of Lamont Observatory, pointed that the tidal wave which was ported to have swept 300 yards Agadir did not necessarily po a submarine origin for the qu The tremors could have produced immense undersea landslide or bidity current " which could turn have created the tidal wave

Doctor Ewing further pointed that the severity of tremors as corded around the world is necessarily a mark of their de tiveness Much depends on factors as the nearness of cities elasticity of the terrain beneath and the presence or absence of ti waves

Jack Oliver a seismologist at mont said that in this case the centers of the quakes (there

hem) must have been right e city

ssor Keith Edward Bullen of ersity of Sydney, Australia, he world s leading theoreti the structure of the earth s has pointed out that the earthquakes has given sci e mo t valuable tool with o probe the interior of the

are two types of waves travel from an earthquake downward into the earth re the primary or P waves h the particles of the earth ongitudinally as the waves and the S or secondary in which the particles move s In solids the P waves travel ent faster than S waves

P waves which go right the earth to the other side minutes and 12 seconds to

ds do not transmit S waves bly It follows that those of the earth found to transmit both S as well as P waves are solid

Failure to detect S waves is evi dence that the part of the earth con cerned is in a fluid state

One of the early triumphs of seis mology was the discovery and pre cise location of a central core of the earth at a depth of 1 800 miles be low the surface As the radius of the earth is nearly 4 000 miles the ra dius of the central core is thus 2 200 miles The region above the central core is called the mantle of the earth

UNTIL 1936 it was believed that the central core was of uniform composition Then a Danish woman seismologist Miss I Lehmann pro duced evidence of the existence of an inner core of an 800 mile radius Further work in the United States and in England lent strong support to Miss Lehmann s conclusions The latest evidence was provided by seis mic waves produced by the explo sion of four megation size hydrogen bombs by the United States at Eni wetok in the Pacific in spring 1954

Say Life Could Exist on Venus

VAPOR in the atmosphere of below the cloud level is more nt than has been thought a Hopkins University scientist has ed

• • •

tor John Strong said that water in the atmosphere of Venus was red by scientists studying rec f the planet made from a manned n flying some 15 miles above the s surface in November 1959 her scientists have suggested this finding raises the possibility that some sort of life could exist on Venus

Finding water vapor in the atmos phere of Venus is the first indication of water on the planet which is known to have a great deal of carbon dioxide in its atmo phere

The amount of water measured in the Venus atmosphere is about f times more than found in the strato phere and is about above high level clouds Strong reported

Drugs, surgical techniques, tiny hearing aids are some of the

New Tools To Defeat Deafness



by Elizabeth Honor

Condensed from Cosmopolitan

IN 1954 a Detroit automotive executive's business tensions were becoming intolerable as it became increasingly difficult for him to hear. Two years later, he was again relaxed and conducting his business with ease. He had regained 90 percent hearing.

No miracle, but a dramatic operation—the hour long fenestration operation that makes a tiny "window" between the middle and inner ear where bone growth has blocked out sound—had saved him from the terrifying isolation of deafness. On the operating table, he had heard the doctor's voice clearly; ten days later, packing removed from his ear, he had left the hospital. "And I waited eight years!" was his flabbergasted reaction.

In 1956 in California, a hard of hearing housewife burst into tears when her husband arrived home from the office and shouted at her, "What have you been doing today?" Asked in a normal tone, the question would have sounded like friendly curiosity. Shouted, it became to his wife an accusation that she had done nothing all day.

But in August 1957, one day after undergoing the new the three stapes mobilization operations (this one only two years she walked out of the hospital for the first time in six years her husband's normal—and accusatory—voice.

The operation had replaced defective key bones in her ear with a plastic tu eardrum to her action. "I even l leaky faucet—I c

In 1959 realized But e word d newest four k panop two st hours had a t amazin formed l geons

t down from above and fash
into a serviceable new drum
tion Brother!

17 million people who have
ss—about one in every ten
the United States—such
defeating poor hearing are
On the list of advances are
that are ushering out such
as meningitis infected si
nd adenoids all common
deafness

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s the GSR— galvanic skin
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'59 at the Chicago meeting of
merican Association for the
cement of Science, impaired
g was revealed to have a seri
mpact on an individual s per
ity

Clues to the terrors of living in this cottony world come from the deafened themselves 'The tender, the intimate the loving things are gone ' 'If my child is sick I can t even telephone a doctor

Says one Imagine yourself in a room with a locked door and people are talking to you from the outside You can hear the sound of voices—but you cannot understand what they are saying

Take the irritation and tension of this situation Multiply it 100 times a day then by 365 This is the emotional load that people who are hard of hearing must carry

Among their fears permanent deafness irritating their employers and losing their jobs loneliness being misinformed because they dare not ask questions

What causes hearing loss? One man after attending a business con ference in which he realized he had missed most of the important points hurried to an ear specialist Exami nation revealed he had conductive deafness middle ear impairment which is the problem of 40 percent of the people who begin to miss what s being said He was one of the 20 percent whose conductive deafness is caused by ear infections or inflammation since childhood Drugs and treatment gave him close to normal hearing

Advances in Surgery

Had he been one of the 20 percent whose conductive deafness is due to oto-sclerosis—an accumulation of bony tissue in the middle ear which

Drugs, surgical techniques, tiny hearing aids are some of the

New Tools To Defeat Deafness

by Elizabeth Honor

Condensed from Cosmopolitan

t down from above and fash- nto a serviceable new drum. tion "Brother!"

the 17 million people who have loss—about one in every ten in the United States—such in defeating poor hearing are es On the list of advances are gs that are ushering out such as meningitis infected si and adenoids, all common of deafness

instruments uncannily meas ring even in infants newest *is the GSR—'* galvanic skin nce'—test which measures much a child hears by the *he* perspires as he awaits *ectric shocks*

nic Aids

tronic advances are creating more successful hearing currently in the works is a mechanism that is a sound *It* spaces out rapid conver s a Linotype spaces words in of type Newly designed sur struments make such opera fenestration and stapes mo on possible Of great help to geon are glasses that magnify icate ear bones to 40 times ormal size

t is it like to be deaf? What s to the personality of some ing his hearing? In Decem 59 at the Chicago meeting of merican Association for the ement of Science, impaired was revealed to have a seri- pact on an individual s per

Clues to the terrors of living in this cottony world come from the deafened themselves "The tender, the intimate the loving things are gone' "If my child is sick I can t even telephone a doctor"

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What causes hearing loss? One man after attending a business con ference in which he realized he had missed most of the important points, hurried to an ear specialist Exami nation revealed he had conductive deafness, "middle ear' impairment which is the problem of 40 percent of the people who begin to miss what s being said He was one of the 20 percent whose conductive *deafness* is caused by ear infections or inflammation since *childhood* Drugs and treatment gave *him close* to normal hearing

Advances in Surgery

Had he been one of th whose conductive d to otosclerosis—a bony tissue in

causes the footplate of a small bone that looks like a stirrup to become rigid and fixed, so that sound fails to reach the inner ear—a stapes mobilization or a fenestration operation would have been the solution

In ideal cases, 80 percent of patients may gain close to normal hearing after fenestration Ideal subjects for stapes operations have about a 30 to 70 percent chance for successful results Only since 1939 has fenestration opened doors to sound Only since 1952 have startled stapes patients while on the operating table heard the tiny click that signals their new hearing For pregnant women and young people in their 20s or 30s who are particularly susceptible to otosclerosis one of these operations can mean a world regained

Nerve deafness which affects the other 60 percent of deafened people of all ages has a variety of causes—and there is help for all of them Causes of nerve deafness range from underwater swimming to neglect of abscessed teeth Among those hardest hit are children

"Why is my child deaf?" is the heartbroken wail of millions of mothers In the United States 3 million school children and an *uncounted* number of preschool children are known to have hearing loss

Otologists believe that early detection and treatment may prevent at least half of deafness "About 80 percent of early deafness occurs be- child is five years old," re- the U S Department of Education, and Welfare

About 15 percent of mothers w
have German measles or other v
infections in early pregnancy h
nerve deaf children Parents with
Rh blood problem can save t
child from nerve deafness thro
transfusion The common cold i
stands revealed as another m
cause of hearing loss So do mu
and scarlet fever After colds
similar illnesses, children sh
have hearing tests

Child Can't "Grow Out of It"

"My child will grow out of it
a comforting thought but a m
fallacy No child "grows out"
deafness "The pathetic thing"
one otologist, "is that often we
a child for the first time at the s
three or four This is tragic Valu
years of medical and educati
help have been lost"

Between the ages of two and
a child s speech develops For
reason hard of hearing toddlers
wear hearing aids Even babies
extreme nerve deafness can
learn to chatter with other chil
and adults A new program beg
1956 at the Hearing and Sp
Center of Bellevue Hospital in
York has proved that very y
children who are markedly deaf
learn to talk more normally
naturally

This is not the arduous o
method of specialized training
reading, feeling of a teacher s th
for vibrations—from which a c
learns a "mechanical" speech
infant today can be fitted with
of the advanced hearing aid

onics research during World
I made possible. He is trained
rmal play Result children
hearing impairments are now
ng public schools in increasing
rs and often they top their
mates scholastically
I not deaf!" is the often angry
ffended answer to the some
exasperated question, ' Why
ou get a hearing aid?" To put
ting help is dangerous Neg
conductive deafness becomes
Yet, teenagers still wait an
e of seven years before seek
p and adults wait an average
years
dren are happy with hearing
self conscious parents do not
the feeling that there is
ing "wrong" or embarrassing
it Explains one psychologist
ren are an extension of a
s ego A parent sometimes
hat if he lets his child wear
ing aid, he will be admitting
ack"
a small child who has never
the wonder of sound is some
almost inexpressible One four
ld girl with nerve deafness
sound for the first time when
diologist at the New York
e for the Hard of Hearing
test earphones over the
ears and tuned up the volume
bove normal The little girl
d then ran to her father,
ed his pockets of everything
ooked like money, poured it
the audiologist s hands and
d toward the door, protectively
the earphones

Yet, "A hearing aid will make my child 'different' ' is a familiar com plaint But "not as different as he is without the aid " say researchers at Columbia University Investiga tion shows that children wearing hearing aids have better health and fewer personality problems than those children who need aids and do not wear them

Easy prey for quacks are the hopeful hard of hearing people who are out for a miracle ' cure ' Quacks claim they can cure deafness by massage injections drugs Millions of dollars are wasted on charlatans who do nothing but harm

Variety of Help

It is easy for a person with a hear ing loss to find out exactly what is wrong—and what can be done about it He can write to his County Medi cal Association for a list of accred ited otologists He can write to The American Hearing Society 1800 H Street N W Washington D C for the name and address of the branch nearest his town or city

Some people unaware of what's available are saved by sheer luck One father of a deaf child spotted a nine-year old boy on the street The youngster, wearing a hearing aid was chatting with a friend The father followed the boy to the New York League for the Hard of Hear ing office and explained ' I want son to be like this boy "

The league, out of which
the American Hearing
a staggering variety of help
In one of the rooms'

marine seaman with a conductive hearing loss who has boosted his hearing 40 percent with a hearing aid Speech classes have remodulated his voice which during his six months of deafness took on the flat deaf quality

Down the hall a 41 year old salesman grapples with the problem of sudden deafness A year ago he had an income of $50 000 But three months ago after leaving a theater with his wife and another couple he was mugged in the parking lot where he had gone to get his car His temporal bone was crushed the nerve killed A gregarious personality he is still being helped to overcome the emotional shock of deafness He is now one of the 2 percent who hear nothing but he will get help from a hearing aid that conveys v brat ons

H s wife has cooperated with a teacher to help h m learn to lip read H s sense of balance damaged he has learned to line up a p cture on the wall to make sure he is standing stra ght He is getting over his b tter depression He has become an insurance actuary

Speech Classes

Into the reception room comes a pony tailed 11 year-old girl The small barrette that holds up her pony tail is one of the new tiny transistor hearing aids a clear plastic tube goes into her ear Since the a e of two she has worn a hearing aid for congenital nerve deafness She has arrived today to make sure her pronunciation i n t sl p-

ping she will attend a spee hearing class

In another room a schoolbo wants the help of a hearin specifies eyeglass aids—I'll plain glass in them He is giv audiometer test he tries on makes and models of aids to out which is most comfortable gives him best far and near which the most natural tone then referred to the company has the model and style best for If he can afford it the boy pa it himself

Doors to careers to the ente ment of movies TV theater certs are opening to the ha hearing Humor and trivia which have been called the c conversation are becoming

Yet in 1938 a word l ke tration would have sounde gobbledygook

In 1947 no one would ha l eved that by 1960 hundre thousands of people would be in through tiny transistor d

In 1950 no one would ha lieved that a hard of hearin could learn normal or close to n speech

In 1951 no one would hav pected that by 1960 would have the delicious feel being warned after an like stapes mobilization that were simply not to shampoo hair for four weeks or swim fo months

The real miracle is that such l patients can hear clearly, word the surgeon says



...ngs which are Caesar's ..."

...hand this note to your "wise ...d ask him to identify for me ... on the front cover (April ...he left of Gandhi My circle ... know Some said it was ...to me, that is nothing doing

JOHN C WINEMILLER
WESTERVILLE, OHIO

...esar —EDITOR

...ous"

...E DIGEST is a marvelous mag-...wonder if it is as well known ...t to be, it could do much to ...ate young America in science ...ng much to be desired in to ...ld

(MRS) ELIZABETH TERRY
ADRIAN MISSOURI

Restless Tides

...ing the article Secrets of the ...Tides' (April '60) I was sur-... see the following 'Spring ...ll moon, when the moon and ...re both on the same side of ... are larger than the spring ...uced at the new moon when ...and sun are lined up but on ...ides of our globe' ...it be possible that the moon ...ared at all the ...ing and decided to change the positions of *new* and *full* which have been the standard for millions of years?

BETSY EHRBAR
GREAT NECK, NEW YORK

To Miss Ehrbar, and the other "surprised" readers who wrote, we acknowledge printing the error about the relative positions of the earth, moon and sun in respect to the time of the full moon —EDITOR

Diet Article Most Helpful

Sirs

Your article "How To Lose Weight Wisely" (May '60) is the most helpful article I have ever read, and it has been placed in my files for re-reading weekly! I am a longtime subscriber to SCIENCE DIGEST

(MRS) GLENN MAREK
WAUKESHA WISCONSIN

Centipede Cerebrations

Sirs

In a recent issue of your magazine I read an item about a centipede who, wrestling for an answer to a disarmingly simple question about his locomotion, lost his sleep and his locomotion to boot Perhaps you have run across the little verse which states the centipede's difficulty

A centipede was happy quite
Until a frog in fun
Said 'Pray, which foot comes after which?"
This put his mind in such a pitch
He lay distracted in a ditch—
Forgetting how to run

A J HAMILTON
KINGSTON (ONT) CANADA

Use of Ether

Sirs

The writer of "Those Amazing ...thetics," apparently overlooked Crawford W Long who reputed... the first to use ether as an ...

MARTIN M ...
CITY ISLAND, N...

Twenty Years Ago In Science Digest

1940

Medicine—Conquest of the entire world of disease-producing germs seems possible as a result of the discovery of germs in garden and field soil which destroy the germs of the gram-negative group The discovery was made by Drs Selman A Waksman and H Boyd Woodruff of the New Jersey Agricultural Experiment Station

1940

Atomic Science—A chunk of five to ten pounds of a natural substance—U-235—would drive an ocean liner or an ocean going submarine for an indefinite period around the oceans of the world without refueling One pound of U 235, the substance recently isolated in pure form by Columbia University scientists, is equal in power output to 5 million pounds of coal

1940

Radio—With frequency modulation radio, known as FM, given the green light by the Federal Communications Commission, the stage is set for rapid changes in radio—provided war does not freeze the present art and development Within a few months or a year all the larger radio sets will be built to receive both the more ordinary amplitude modulation signals and FM

1940

Biology—Studies on 65 000 college freshmen in North Carolina, Kansas, Kentucky and Wisconsin during the past 11 years show a tendency toward a decrease in stature This reverses the tendency of former generations to grow taller and mature at an earlier age.

1940

[illegible] ...ted to date, census statisticians and one ... [illegible] 132

[illegible]

Shark Survey

A census of attacks by sharks on human beings all over the world is b carried out through the Smithsonian Institution

There is no question of the seriousness of the situation The ultimate o of the study is "to do something about it," according to Dr Leonard P Sch Smithsonian curator of fishes

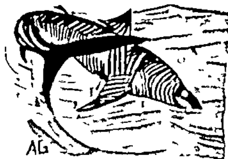
A large documented file of shark incidents throughout the world is b maintained When an attack occurs anywhere, an attempt is made at to establish contact with a physician or scientist in the area, and his assist is solicited in obtaining complete documentation of the attack

In January of each year a list will be prepared of all shark attacks al' the world during the previous year

A research panel is appraising the effectiveness of various antishark m ures, such as use of meshes around bathing beaches and employmer various physical and chemical repellents Rigorous methods have been de oped for testing the repellents, especially in Caribbean and Pacific wa Photographs of shark attacks are being obtained

There can be no question, says Dr Schultz, that sharks are terribly ' ous in most warm and temperate ocean waters There are about 25 of these ferocious fishes Most dangerous regions of the world are ' the southeast coast of Africa, the tropical Atlantic, the Pacific coast of America, and Hawaii

The creatures are almost ubiquitous Some of the most dangerous, ' ple, have ranges extending in summer from the Caribbean to the New England They have b.. to attack swimmers in as little a feet of water



Probably the most dangerous Dr Schultz, is the great white sh *Carcharodon carcharias,* which quents all tropical seas C' ' is the tiger shark with its razor-sharp teeth, which can n p a human leg

Apparently, says Dr Schultz, ' have some mechanism by which can detect slow motions in the such as would be made by bathers A trace of blood in the water the creatures uncontrollable *They will attack anything in the way* known to attack boats

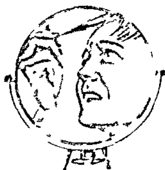
At present, says Dr Schultz, the best advice is never to enter shark in' waters alone, but it is *hoped that the present research will lead to someth* more practical as a safeguard against sharks

CIENCE DIGEST

ot this changing world means to you **35¢** ICD **/Sept. 1960**

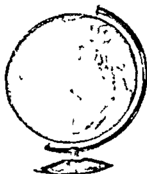
New Hope for YOUR HAIR

the Authoritative New Book



roducing: IENCE AROUND THE WORLD

exclusive monthly feature



hould You Wear ONTACT LENSES?



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A Tooth for Every Job

There is no more apt description of a man devoid of dentition t "toothless as a bird Of all the vertebrate animals from fi h to m the birds are the only major group characterized by ab ence of tee There are creatures here and there without these useful tool , such the turtles, but these are the exceptions to the rule

Even the lowest forms of fishes the lampreys which completely l jaws, have toothlike structures with which they rasp away the fl of their prey Sharks and bony fishes in general have a mouthful teeth variously shaped for biting crushing and holding

As a group the amphibians are fairly well toothed including s teeth on the roof of the mouth in many forms These amphibian tee are generally small pointed and serve mainly in holding and forci food into the throat

The magnificent set of teeth of the crocodile is an excellent exam of the good u e this cla s of animals mal es of its dentition Rep ti teeth are typically pointed for holding of prey and they lack roo

Snake teeth are generally curved backward and may occur in se eral rows on the jaws as well as on the roof of the mouth The snak lower jaw can be unhinged in the middle It feeds by alterna e moving one half of the jaw then the other dragging the prey into its throat by the recurved teeth

have been lo t in evolut on perhaps in part a a means of reducin t weight of the head region as an aid to fl ght

in animal can often t e determined on the basis of one or a few tee

The primitive number of teeth in the mammals i 44 Opo have 50 but mo t show a reduction from the basic pattern Man f example has 32 teeth while the rodents may boast of only 16 though they can do a lot of gnawing with those few!

Mammalian teeth are generally specialized into four kinds incis in front for cutting then canines for stabbing finally premolars a then molar for grinding and shearing

—Horace Loftin for *Science Serv*



by Harry Schwalb

Condensed from The Laboratory

...NECTICUT CLINICAL research ...ers on a project entitled *Size ... Scientific Nibble* watched nib... at work and discovered that ...portions of sugar foods satisfy ...le as much as non sugar snacks ...ning many more calories

...ish cotton chemists used sugar ...nthesize textile finishing agents ...ake wrinkle proof collars for ...sartorially conscious country...

...the Wolfe Agricultural Labora... in Florida tomato plants ...ed with sugar solution and ...planted under adverse condi... survived all the shocks besu-...

... Children's Village (Dobbs ..., N. Y.), 102 boys chewed a 6 inch section of sugarcane daily under lab supervision, a second group drank sugarcane juice a third got neither In 18 months the hard chewers had developed greater tooth decay resistance than the other two groups

• Edible detergents fast-drying house paint tough plywood adhesives faster growing baby pigs and chicks burn resistant tabletops — these are still other achievements of one of today's liveliest ... fields sugar research ...

That sugar is the subject ... multi nation multimillion... search program is only ... has been called one of ... oldest food processing ...

Bread cheese and ... which trail back ... all depend on ...

...Laboratory (V. 1, 25 ... 1950 by ... Company ... Pennsylvania

While the sugar industry may not have as long a recorded history as these three, it does have the distinction that its process is specifically aimed at the prevention of microbiological action.

Mechanical crushing and grinding, clarification by chemical additives, heating and skimming, evaporation, crystallization, draining or separating the molasses, drying the final crystals—just how early these elaborate steps were incorporated into a continuous process is not known, but solid sugar was being transported in quantity in the first centuries of the Christian Era.

Even the sugarcane plant differs in a noteworthy way from other plants. No easy transporting of seeds in dry compact form for it—sugarcane can be transported only as plants or cuttings, followed by weeding and care. Man's prehistoric western dispersal of garden growth sugarcane from New Guinea—sugar's home—to Indonesia, the Philippines, Malaya, Indochina and the Bay of Bengal area began 8,000 years ago, took some 3,000 years to complete.

Evaporation of cane juice to a solid state developed in India (note the use of the Sanskrit word *kanda* for solidified sugar, the basis of our word *candy*). Even though sugar in its solid form was looked upon as a luxury or an ingredient of medicines in these early days, it became a manufactured product in the modern sense, and by the 10th century A.D. both Persians and Egyptians were refining it.

From the Mediterranean
sugar eventually took its pl
one of the great foodstuffs
15th and 16th centuries. A
great explorers transported
1600, the production of raw
from cane grown in tropical A
had become one of the world's
est industries—and one reas
and coffee could become co
beverages on the tables of E

A major revolution in suga
the vacuum pan, patented in
by E. C. Howard, and the pro
of every vacuum pan in the
today. It's still used wherever
try requires the evaporation of
sensitive materials.

In Howard's pan—a closed s
— liquid sugar is boiled
partial vacuum in order to c
the liquid into a vapor and r
it from the solid—the sugar
solved in it. Because of the re
pressure in the Howard syster
liquid reaches a boiling point
reduced temperature. Heret
when liquid sugar was boiled i
kettles at atmospheric pres
caramelized rapidly, with
discoloration and heavy loss of

An outgrowth of Howard's
ratus was the multiple va
evaporator devised by Norber
lieux of Louisiana. Rillieux
nected the vacuum pans in a
and maintained a higher vacu
each succeeding pan.

Rillieux's invention is the co
part of all multiple vacuum eva
tors used in the sugar industry
in many other processes where
economy and the removal of a

of solvent are involved The sugar chemist and chemical Charles A Browne, once Rilleux's invention "the in the history of chemical ring

...ular animal charcoal for de...ng refinery liquors came into about that same time

"suspended centrifugal" in in 1852 was still another bution of science ...ding ma... would sep... the sugar from the when the ...the vac... evaporators "granula... by which s refined s dried by d air in ...th revolv... ylinders ...tionized ...rketing of soon after introduced S It was ...d by the first auto... packaging ...ne which l granulated sugar in 1891

...major sparkplug behind cur... ...ugar activity is the Sugar Re... Foundation located high in ...ll Street building that looks ...the chugging, tugging New waterways

Organized in 1943 the Foundation has supported some 170 projects in universities hospitals and commercial laboratories in the U S Canada England Scotland Cuba and the British West Indies

Research in nutrition forms an important part of the Foundation's program Work here has ranged from a basic investigation of sugar in human metabolism to a study of the possibility of coating teeth with water repellent substances to prevent decay

One of the highlights was the development of methods for preparing sterile solutions of the special sugar required for intravenous feeding of hospital patients

Today, a full two-thirds of all sugar used in the U S reaches the public in commercially prepared foods—baked goods (including premixes), canned and frozen fruits, soft drinks confectionery, ice cream This pattern of distribution is a complete reve... of pre World War II when prepared foods and ... had not achieved their ... ularity

WEBSTER *defines sugar as "a sweet crystallizable substance colorless or white when pure occurring in many plant juices and forming an important article of food the chief sources of sugar are the sugarcane and the sugar beet the completely refined products of which are identical and form the granulated sugar loaf sugar etc of commerce*

The old fashioned conical loaves of sugar are still made in some parts of the world (Belgian refiners produce it for the Bedouins of North Africa who will buy nothing else) but the only modern loaf sugars in America are cubes and tablets

Incidentally the refined granulated sugar of commerce is 99.9 percent pure thus ranks as the purest of all organic substances produced in such volume

One recent discovery consumers like some familiar foods—for example canned fruits and ice cream—considerably sweeter than had been supposed Preferences were ascribed not to added sweetness but rather to improved flavor

Reason sugar in addition to adding sweetness masks sourness bitterness and saltiness—the other tastes perceived by the tongue—actually enhancing the aromas which are sensed by the nose Aromas are more readily held in solution by water than by sugar solutions When more sugar is present aromas are freed and reach the centers of smell in higher concentration

These concepts have been applied successfully to the laboratory improvement of the flavor of canned peaches pears apricots boysenberries tomatoes corn—also to wines

Poultry to Plastics

But it s in the non food uses of sugar from poultry rations to plastics that current researchers really shine In fact the term *sucrochemistry* had to be coined for the study of sugar as a basis for chemical manufacture

Of the industrial and household synthetic detergents in current use the majority show some sort of resistance to breakdown by bacteria in the course of sewage treatment Thus detergents contribute to the sudsiness of streams and rivers interfering with the chemical purification of metropolitan water sup . So researchers concentrated ... detergents that can be decomposed biologically devel... promising ones based on sucr...

Because of their high palata... edibility digestibility and food... ue these *surfactants* may be ployed widely in food product... emulsifying salad dressings and... er food products that are not a... Added to the diet of people... have difficulty in digesting fat... aged the very young—they... dite the absorption of fat from... digestive tract

Some sugar detergents can b... mulated into bars for toilet or... dry use into shampoos that... sting Junior s eyes and into ch... creams and cosmetics

And since sewage disposal b... ria can use sugar compounds... their source of food energy the... detergents disappear from se... fast

Alkyds are resinous comp... that chemists form by react... tain complex acids and glycer... that Mrs Housewife knows a... ' porcelain finish on her ref... ator

Drying Oils for Paints

Laboratory attempts to intr... sugar into this reaction as a re... ment of glycerin were not succ... but the work did lead to f... drying oils for paints These s... based drying oils form glossier... er films that adhere to metal... firmly wrinkle less on drying

There s a new plastic from s... too as yet unnamed that reve... strength under bending stre... and impact equivalent to—or ...

One recent discovery consumers like some familiar foods—for example canned fruits and ice cream—considerably sweeter than had been supposed Preferences were ascribed not to added sweetness but rather to improved flavor

Reason sugar in addition to adding sweetness masks sourness bitterness and saltiness—the other tastes perceived by the tongue—actually enhancing the aromas which are sensed by the nose Aromas are more readily held in solution by water than by sugar solutions When more sugar is present aromas are freed and reach the centers of smell in higher concentration

These concepts have been applied successfully to the laboratory improvement of the flavor of canned peaches pears apricots boysenberries tomatoes corn—also to wines

Poultry to Plastics

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And it doesn t acquire a
of static electricity when
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do

ready the new resin looks good
ers concerned with paper
wood impregnation plywood
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re bonding Valite Division of
ne Sugars Inc is producing
sugar plastic in pilot plant
tes

there is SAIB (sucrose
e isobutyrate) developed by
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It has the pleasant ability
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s ll other major experiments
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n a have given chemicals from
h fibers and pharmaceuticals
be produced And dextran a
substance produced by the
t of certain bacteria on sucrose

t used for imp oving—of all thin s
—oil well drillin mud

Paper from Sugarcane

Byproducts are still another ac
tive subject of ugar research From
bagass e the fibrous portion of the
cane stalk remaining after cru hing
comes furfural u ed in makin ny
lon Ba a se itself has been shown
by Univer ity of Florida re earch
ers to be useful as cattle feed when
spiked with molas es Paper in
which bagas e is the only fiber is
being produced widely

Sugar beet pulp too has a new
look These slices of beets from
which sugar has been extracted
long u ed in feeding farm animals
are now ammoniated This forms
compounds which are acted upon by
bacteria present in the digestive
tracts of cows and other ruminants
to synthesize valuable protein

Thus in 1960 even Florida beef
cattle benefit from the sweet hand
of research while alongside Florida
hotel swimming pools sun bathers
sip icy daiquiri cocktails that ben
efit in their own way from the mag
ic white sand called sugar



Tranquilizers Make You Feel Worse

DISCOVERER of the tranquilizer
Dr Frank M Berger, presi
Wallace Laboratories said that
looking for a l ft not take
izers In spite on n

ion patients feel much worse
taking tranquilizers than before
Berger said He added that
izers are u ef l in treat ng
tal illne s b t are not

WHY YOUR HOSPITAL BILLS GET BIGGER



by Donald C. Corner

TODAY your hospital bill is twice as high as it was ten years ago but only half what it might be in 1970. Despite the fact that cost of care has skyrocketed, almost every other family had a patient in a hospital last year. Why have hospital costs soared?

Inflation?
Higher wages?
More complex treatment?
Better care?
Expensive equipment?
Poor management?
Larger staffs?

Each of these factors has had a direct effect on the hospital bill paid by 23 million Americans during the last 12 months.

Wages Take 70 Cents

Wages for hospital workers today take about 70 cents of dollar spent for hospital care number of hospital employee increased significantly since W War II and wage rates hav vanced faster than ever before

Until 1945 most hospital on a 44- or 48-hour week work week has dropped to 40 and the number of employe created to keep pace with the and complexity of care spurred by fantastic develo in medical science has move ward at a rapid rate

The average length of stay hospital has been halved amazing advancements in trea have been undertaken req dozens of new skills and greatl mented work forces

Heart surgery is becomin mo place. When the heart p In it 20 highly skilled pe

ired to perform surgery and
e the equipment Yet the pa
often discharged in less time
to be required following a
ectomy

years ago nurses earned
month Today, at Seaside
rial Hospital Long Beach
the scale for general duty reg
nurses is $330 to $390

y New Instruments

ical laboratories and diagnos
ray departments in a modern
l are your doctor s depend
ads to rapid accurate diag
and treatment The simple
with thermometer stetho
and blood pressure apparatus
been supplemented with scien
sts often involving extensive
nic measuring devices
liac catheterization for exam
built around a television like
nic device costing $10 000 to
000 It requires skilled tech
ns for operation and mainte
e plus a heart specialist for
n sion and interpretation
ectroencephalography the elec
l measurement of brain waves
tial to accurate diagnosis of
conditions is basically an
onic recording and amplifying
containing 69 radio and tele
tubes

ld C Carner is administrator of
aside Memorial Hospital of Long
California A highly regarded
ne writer in the field of medicine
arner is presently working on his
ok

Image amplification calls for a TV screen to magnify the image picked up by X rays so the radiologist may more accurately pinpoint the patient s problem

Physical and occupational therapy utilizing hydrotherapy, ultrasonics infrared heat massage, exercise and other forms of treatment, have accomplished wonderful results in reducing pain and speeding more complete recovery from illness and injury Well trained physical and occupational therapists add measurably to hospital payrolls

Just a few years ago not more than ten people were involved in X ray, laboratory and therapy work at Seaside Today there are five M D specialists devoting full time to these tasks and guiding the work of Memorial s 54 highly skilled technicians clerks and aides

Hospitals too have felt the full effects of inflation in terms of the cost of construction food pharmaceuticals, supplies, utilities insurance and the balance of items that account for the 30 cents of each dollar expended for these goods and services

Donations Drying Up

Another important element in the cost of hospital care is the change in pattern of donations Before taxes were as high as they are today n hospitals running in the ' red, assured that generous ' would pick up the tab at the the year This enabled charge less than cost for

Not only does this m

but the "donation shoe is on the other foot Today local regional and state governments frequently are required by law to provide care for indigent citizens Seldom does government pay the full cost of care

Failure of government to pay full cost for its patients forces other patients to pay more than cost For years New York City hospitals have provided care for the city s medically indigent patients at far less than cost Effective July 1 1960 city officials raised the per diem rate paid hospitals from $20 to $24 while recognizing that the current daily hospital cost is $29

Voluntary hospitals in New York City lose more than $8 million annually because the city government will not pay the full cost of care for hospitalized patients This situation is repeated by city and county governments across the nation

$30,000 Per Bed

Construction of hospital facilities has become very expensive—$20 000 to $30 000 per bed is the current range for new and remodeled hospitals Years ago most construction capital was contributed now many hospitals have to borrow money Recently Minneapolis hospitals raised $17 million in a two-year city wide fund drive They will borrow about $13 million more to obtain the sum needed to keep pace with needs of the community

As former ...

Nursing education fits this pattern Today a hospital-oper school of nursing must meet educational standards Not so ago student nurses learned pr ly by doing and in doin did a great deal of hospital wor which they received no financia ward The patient paid le s bec the student contributed her ef in exchange for an education

What is the outlook?

Costs will continue to increa



You ll agree I believe that you are in the hospital and w nurse—you want her *right no* as long as your situation dem You want *her to* be a real an mercy competent skillful u standing tactful interested in and your problems I think agree too that the registered n $2 an hour in today s labor ma *for someone upon whom* y u depends is a relatively low ra

If a patient is going to ge quality of nursing he wants hour of need hospitals and pa will have to pay at least as m an R N as *industry does for* s workers Hospital pensions insurance and other fringe be will undoubtedly follow the pa of industry raising costs still h

Continuing to drive costs u be the benefits of *medical res*

Is the price worth it?

More lives are saved We ar

Recoverv from illness is a more complete it possible to measure the productivity of the hun of thousands of people now who might be otherwise dead judgment of the Ameri would be apparent as ncreased their use of hospitals e the greater dollar cost Their bears out the value with Americans regard each life learly points up the all out made to safeguard the health ry citizen

ures for cancer heart di ease her major causes of death are ped—regardless of cost—they ndoubtedly be made available ents through our hospitals n America would deny better and longer life because it nore?

Is Over?

there are many signs indicat the worst of the steep climb ital costs may lie behind us mple hospitals formerly pro essentially the same amount for each patient regardless ndividual requirements More an was nece sary for some s not enough for others This flected in the cost of care more hospitals are thinking ents needs as being divided hree categories maximum self help

nen $10,300 000 Seaside hos is provided intensive medical d surgical areas for patients ng maximum care during the critical phase of their illness In these areas will be concentrated the maximum number of nurses so that every acutely ill patient will be un der constant observation and con tinuous treatment Here a far lower cost prevails rather than that which would arise were each patient to need round the clock special nurses at $50 $60 a day

After the patient has progressed in his recovery he will be moved to the normal medical or surgical nurs ing unit Here he will again have as much care as he requires but not as many nurses will be needed—and the cost will be reduced

Seaside hospital is planned so that should experimental "self help care prove feasible a floor de signed for this purpose may be add ed Then patients well along in con valescence would have their meals in a dining room They would take their own medicine bathe them selves and in other ways participate in their own care Fewer nurses would be required and again costs would be reduced

Of greater importance—more lives would be saved recovery speeded and patients would be highly pleased with hospital care

Electrically adjusted bed elec tronic intercommunication between patient and nurses piped oxygen pneumatic tube systems and closed circuit TV are now making more pleasant while increasing effectiveness of nurses

There is great mating certain supporting not dealing directly

from political interference and proper operating safeguards hospitals provided all of the ment from the fund drive

... now has a state law encour this type of local government nonprofit community hospital features designed to provide expansion without throwing the burden on the hard pressed ent

You Can Help

The American Hospital Association has estimated that $1½ billion ... needed for remodeling of ... facilities together with new construction. If you are concerned about hospital facilities and rising hospital costs here is how you can help

• By becoming a volunteer you ... help turn the tide of high hospital costs

• Show interest in your hospital. Find out who you know on the Board of Directors or Medical Staff. Learn what steps your hospital is taking to hold costs in line

• If expansion is needed, help raise funds by working on the campaign or bond issue so patients won't have to pay the full cost of new buildings and equipment

• Help your hospital school of nursing become financially self supporting so that students will get a good education, but not at the expense of the patient

• • •

• Insist on local government paying the full cost of care it purchases. Have this question on the program of your local organizations. Pass a resolution and send it to your government officials so that sick people will not have to underwrite government expense



Lethal Protons Fill Solar System

... storms which fill much of the ... system with lethal radiation have ... observed some lasting as long as ... days

... Kinsey A. Anderson of the ... University of Iowa said the data ... the storms was gathered in a series ... high altitude balloon flights last ... mer

... scientists are uncertain as to the ... of the ... storms and it ... likely that many years will elapse before their timing, their paths and their extent can be predicted with any accuracy

The storms do not threaten the ... ate goal of the man in space ... because the astronaut ... protected by the shield of ... magnetic field. But the disc... raised serious doubts as to ... will be possible to send ... beyond the earth's magn...

A French anthropologist studies the evidence supporting its existen

Is There An Abominabl Snowman

by Eugene Schreider
Associate Director, Laboratory of Physical Anthropology, Paris

Condensed from Discovery

ANY IMPROBABLE OCCURRENCE gives rise to speculation before a serious attempt is made to verify it and the existence of the abominable snowman is no exception to this rule it has provided the occasion for numerous articles but there has been very little real critical analysis

Verification is difficult for two reasons Firstly it requires expeditions to inaccessible parts of the world and secondly since this is rather a thankless task it will probably be left to those who are already convinced to take the initiative Only the converted who believe that the snowman really exists would be prepared to face the hardships and the dangers of such an expedition

For some months a special commission of the Academy of Science in Moscow has been studying the enigma of the snowman The members of this commission hold opposing views Some think that the snowman probably exists and that he may be the last surviving relic of a bygone age—a man who would not have benefited from a favorable social and technical environm

[illegible]

11

the others, he is simply a legenda character

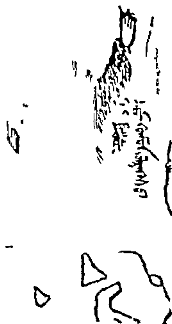
Two small documentary bod prepared by the Moscow Comm sion show that beliefs which ha or might have, some relation to snowman are scattered over a v wide area The question is to f out whether these are nothing m than beliefs

As the Commission was reluct to omit anything these two bo include all the available documen tion with the result that clearly plausible accounts are found side side with facts which demand ser consideration

Among the early accounts t are a few which are not enti fantastic Johann Schiltberger is parently reliable for on returnin Bavaria in 1427 after trav around Asia for nearly 30 year quoted correctly the names of pe and places

He refers to a mountain r which separates Siberia from a d desert These mountains which well have been the Altai wer habited by "wild men whose bo except for the face and hands entirely covered by hair

S[illegible] er describes how [illegible] of the G[illegible] a wil[illegible]



...ion woodcut of a wild man ...l by Dr Vlcek a Czechoslovak ...cheologist to document the ex... of the abominable snowman

...oman as a gift and a little ...e writes

...ave been to this country and ...ed all these events and when ...with Tchel ra the son of the ...saw everything with my own

...kra is a historical figure and ...erger was well placed as an ...r since after being captured ...Turks he was himself 1 ke ...d couple he mentions offered ...esent to Tdiguell

Evidence is Sketchy

...us now consider later evi... There is a paper written by Prof Jamtsarano in 1930 which supports the Mongolian belief regarding the wild man but apart from the deeply rooted conviction of the author it provides no precise facts

Also Prof Rintchen of Ulan Bator Mongolia in a more recent statement in 1958 gives no direct proof but testifies to a tenacious belief among the aborigines Reports from Soviet soldiers guarding the frontier in the Pamir Mountains are rather confused but these soldiers are almost the only eyewitnesses who have supplied direct information for in the vast majority of cases the reports are secondhand There are however two remarkable exceptions

The first comes from Dr Karapetian of the Soviet Army Medical Corps who found himself in the mountains of Daghestan in the Caucasus towards the end of 1941 The local police consulted him about a strange man whom they had arrested supposing him to be an enemy agent This man was naked—in the middle of winter!

He was writes Dr Karapetian undoubtedly a man but his chest back and shoulders were covered with dark brown hair whereas the inhabitants of that country have black hair Moreover this hair was like a bear s fur and about two or three centimeters in length

The man was about 6 feet tall His skin was dark and he had neither beard nor mustache but fine hair covered the whole of his face He had a large nose and a vacant ex...

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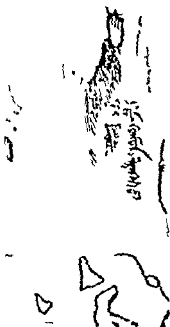
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Discovery (Ma[illegible] 1960) © 1960 by [illegible]



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Recent Evidence is Sketchy

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The man was His skin was dark beard nor covered the had a large

pression his face had no apelike characteristics however

He appeared to be incapable of speech He took no notice of the bread and water put before him From his excessive perspiration it was obvious that heat made him un comfortable and therefore the ex amination took place in an unheated building

Lastly this strange being was cov ered from head to foot with lice which belonged to none of the three species known to exist in that part of the world

Was this man a freal individual? How did he survive naked in the snow? What did he live on? These questions remain unanswered It is a pity that Dr Karapetian could not catch and preserve a few lice

The second comes direct from China and is supplied by Prof Koo Wai Loo Director of the Second History Institute in the Chinese People s Republic

This scholar acknowledges the ex istence of the primitive' man of the Himalayas but distinguishes him from the wild man of the mountains south of Shensi This man differs physically from modern man only in his extreme hairiness He lives in the cold mountains without clothes and as far as we know has no tools

One of Prof Koo Wai Loo s state ments seems to imply that this man has no knowledge of fire nor—dis turbing if true—has he any knowl edge of the spoken word

Professor Koo Wai Loo also states that these wild men are quite com mon and that before the revolution Chinese peasants hunted them lik animals or kept them as slave fc they could be tamed and taught t do very simple jobs In 1954 Ko Wai Loo himself saw one of the slaves Though the creature spok no language he had learned to r peat a few Chinese words and to d rudimentary ta ks

Here again the hypothesis of patholo ical case might be put fo ward for after all the witness sa only one wild man If we accept h statement that these men are qu common and were kept as slaves b the peasants until recently the remains the problem of identifyin them Who are these men who ar perhaps not much more hairy tha the Ainu (a race well known to an thropologists) but who cannot talk

Evidence from Folklore

The general impression receive from a careful study of these tw short books may be summarized a follows The domain of the snowm or wild man extends over a vast te ritory stretching from Mongol a t Tibet and the Caucasus

Some of the evidence provided b these books is almost certainly take from folklore or legend with rema to which a certain amount of verb similarity is noticeable The *alma* of Mongolian legend correspond ap proximately to the *almassty* or *a massty* of Kabardino in the Ca casus These beings though huma in appearance are covered with fu

Since there is no lingui tic li between these two countries the ge graphical exten ion of the myth ma

ibly be explained by migration borrowing The *almastc* are also [illegible]ken of in the Pamir Mountains here another mysterious being the *[illegible]* is equally well known

Further belief in giants athletic [illegible]es or wild hairy men is very de[s]pread extending beyond the [illegible]t territory of A[s]ia We find it in [illegible]nese as well as in the folk stories Western Europe But must we [ass]ume that folklore has no basis in [re]ality?

A new argument in favor of the [au]thenticity of the wild man or [sn]owman has recently been suggest[ed] by Dr Vlcek a Czech archeolo[gis]t who has been working in Mon[goli]a A book published in Peking at [th]e end of the 18th century shows [amo]ng various illustrations of Tibet[a]n fauna a primate standing erect [up]on a rock This being is called [h]uman animal

A more recent edition of this book [p]ublished in Mongolia shows the [sa]me being more humanized and [n]ow called "wildman Dr Vlcek [poi]nts out that all the other animals [r]epresented in these books are true [spe]cimens of actual fauna and not of [ima]ginary beings He therefore be[lie]ves that "both illustrations of the [wi]ld man document in a remarkable [wa]y, the existence of this creature"

But there is in fact only one [ill]ustration for the picture in the Mongolian edition is simply a modi[fi]ed reproduction of that in the Pe[kin]g edition Even the rocks on [whic]h the wild man stands are clear[ly] copied from the original The [ori]ginal picture looks like a some-what stylized ape it is the copy which looks more human

Doctor Vlcek is an archeologist Had he been familiar with anthropological literature he would perhaps have noticed that in Europe too early illustrators had an irresistible tendency to humanize monkeys T H Huxley once reproduced some picturesque and amusing samples of these documentary specimens

Doctor Vlcek points out that Prof Rintchen has collected important documentation about other people s encounters with the *almass* This is true But so far as I know in spite of long and patient research Dr Rintchen has never met any *almass* himself once again it is a question of secondhand evidence

As a biometrician I have been prompted to take statistics of certain details which appear in the various descriptions

Though the figures are too small for a real statistical test it is noticeable that in several independent accounts the hair of the snowman (or his local equivalent) is described a shaded brown brown lighted with red or reddish brown

It is true that some other accounts describe it as gray but again these are independent reports It is not very much to go upon but it may throw some light in the midst of so much uncertainty and contradiction

On the whole the documents unconvincing but they serve mind us of the okapi the can animal which for a time was thought to be animal of Congolese

Mighty Midget of Atomic Power



A 200 pound nuclear reactor is scheduled for many chores

Condensed from Skyline

THE FIRST APPLICATION of nuclear fission power to provide electricity in space utilizes a 200 pound reactor which is about the size of a five gallon fuel can

Designated SNAP 2 (Systems for Nuclear Auxiliary Power) the thermal reactor was developed by Atomics International under contract to the Atomic Energy Commission s Office of Aircraft Reactors

Snap 2 is one of a family of systems for nuclear auxiliary power under development by the commission for space vehicles and is the first of the systems to employ a fission reactor as an energy source

One of the big obstacles to the formation of a dependable link in the U S defense network has been the lack of a reliable longlife power source a satellite would have to carry for its instruments to justify the mission and the vehicle program costs

would take some 500 000

pounds of chemical storage batte to supply for a year the few k watts of electricity required power the satellite s commun tions and data gathering syst m

At present no U S rocket en can boost anything like 500 pounds into orbit around the ea However the Atlas boosted A and Centaur vehicles will prov the capability of several tho pounds in the near future

A SNAP 2 experimental reac has been operating at full power several months and it is still p forming at design conditions successful operation is positive de onstration that nuclear reactors be made small enough for space plication and can at the same ti produce power at high enough te peratures to be useful for effic power conversion to electricity in space environment

Power for a Year

The final system will operate attended in the weightless vacu of outer space and provide 3 k watts (3 000 watts) of electric with an unshielded weight of abo 600 pounds The system shielded a radiation resistant payload w weigh about 700 pounds

With the shielding nece an protect transistorized circuitry fro radiation in an unmanned space v hicle the SNAP 2 system wo weigh nearly 900 pounds In manned spaceship it would wei approximately 2 400 pound At pounds it could be utilized by e the Agena B or Centaur veh

d the 2 400 pound manned power tem can be considered for the as Centaur and Saturn Centaur ter systems

SNAP 2 is not a propulsion sys n It is a compact nuclear reactor give satellites more than a year s ply of electricity thereby adding onger useful life to large orbiting icles

The SNAP 2 system employs the ne concept as ordinary steam ctric plants with the exception t mercury vapor is used instead steam and the cycle heat is re ted by radiation to outer space tead of to cooling water The ltweight high temperature re or is made possible by the use of enriched uranium 235 alloyed h zirconium metal hydride which es as a fuel moderator material

atoms 61 Fuel Elements

he sensitive heart of SNAP 2 sts of a reactor core containing cylindrical fuel elements The lear reaction takes place within core to deliver 50 000 watts of mal energy to a liquid sodium t transfer fluid that travels gh the core The fluid enters 1000° Fahrenheit and exits at 0°F

hi makes SNAP 2 the hottest l fe reactor so far known to the world In the past few months is operated continuously nonstop a million degree Fahrenheit rs Tubing carries the hot sodium a boiler containing mercury, ch vaporizes and drives a minia mercury vapor turbogenerator The mercury vapor then goes through a condenser and back into the boiler

This method is just a variation of a conventional vapor cycle—still the best method to use in space A future development could be the elimination of the boiler and use of the heat from the nuclear reaction to vaporize the material right in the reactor But this simpler system may be a long time coming

A unique feature of the SNAP 2 power conversion arrangement is that it has just one moving part a rotating shaft that floats on a pad of liquid mercury and drives the turbine generator and all pumps and bearings This simplicity contributes to long life with no maintenance

An electrical power plant operating at full power for one year in space might be compared to running an automobile at full speed for one year Such an automobile would travel 500 000 miles or 20 times around the world without stopping for an oil change or a tank of gas

Successful achievement of these technical milestones prompted the AEC to scale up the SNAP 2 system to furnish the increased power which will be required for future NASA space programs

One of the advantages of t SNAP 2 is that it can be step from 3 to 30 kilowatts little increase in size or could be scaled up to (500 000 watts) change in size and design

Besides the virtues of compactness and lightness SNAP 2 is a low cost system Its fuel consists of uranium that has been blended with zirconium hydride which permits the reactor to operate with a very low uranium inventory

In this way SNAP 2 requires only one tenth as much expensive uranium for its initial charge as does a fast reactor burning the fuel in a pure state This means the cost is also only about one tenth of the fast reactors

In addition the SNAP 2 system will withstand the severe shocks vibrations and temperature changes associated with missile launch and will not constitute a hazard to personnel, facilities or the general public

The SNAP 2 unit will be instrumented to start or stop automatically on a radio signal from earth When the satellite reaches its orbit the switch will be tripped and SNAP 2 will provide the electricity for another advance in space applications

Atomics International has the SNAP 2 development about half completed The reactor has been checked at full power and the power conversion unit developed by Thompson Ramo Wooldridge is also in working order But the two still must be put together requiring additional engineering and testing Finally performance qualification *reliability*, environmental and endurance testing must be completed with the final system before flight tests will be *initiated*

There are only a few know sources of energy for these vehicl that can possibly meet the enduran and weight restrictions required f space flight They are radioisoto decay, nuclear fusion nuclear f sion reactors, and solar ener sources

In considering these varic sources it has been shown th radioisotopes are practical only to several hundred watts electri output Controlled nuclear fu has not yet been achieved and does not appear practical in t next two decades Thus only r clear fission reactors and solar e ergy sources may be considered f higher power systems in the ne 20 years

Currently it appears that so mirrors and boilers that could run vapor turbine similar to the SNAI turbine system will be limited application because of enormous s and weight In addition precise a continuous facing toward the sun required

Large space vehicles now unc development for 300 mile orb such as Atlas Vega with a 50 pound payload Atlas Centaur w an 8 000 pound payload the C Saturn vehicle with 25 000 pour of payload and the 150 000 pou payload Nova must be more rel al to prevent costly failures and m operate usefully for long periods amortize their extremely high init cost

Thus with the planned increa in vehicle capabilities electric p w requirements will rise rapidly fr

e few watts of today to many thou nds of watts for the Saturn and ova vehicles

The progress made in developing NAP 2, the first space reactor uxiliary power plant is a timely d important step toward being ble to supply the large amounts of on board power these vehicles ll need

an Needs 400 Watts

It is estimated that 400 watts of ontinuous electrical power are nec ssary to support the life cycle of ne man in space and to provide him th the instruments and communi tions power he requires With emical energy it will require about 60 pounds of batteries for each day orbit for the 2 000 pound Atlas ercury vehicle which is to carry e Astronauts into space

The 25 000 to-30 000 pound satel e boosted by the Saturn would carry ten men for ten days using chemical batteries But Saturn, using a 30 000 watt nuclear reaction system might be able to orbit ten men for a month or more

When SNAP 2 goes to work, among its first jobs will be to power space stations and vehicles for deep space probes With SNAP 2 and a Centaur or Saturn booster, such a probe should be possible in 1964

A 30 kilowatt version of the AI compact reactor should also be able to provide power for a small ion propulsion system giving a soft continuous push to a satellite already put into orbit by chemically propelled rockets Ion propulsion (See, *Spaceships of the Future*, Nov '59) might be used to push a satellite already in an orbit 300 miles up into an orbit some seven times higher A SNAP system might give an ion propulsion system muscle enough to take a vehicle to Mars →

However SNAP also has a big potential closer to earth In keeping with the national programs, the thermal reactor may be used in world wide television relay satellites, and in communications weather and navigation satellites

Communication satellites could broadcast with SNAP s 30 kilowatts of power at message costs comparable to those for overseas microwave transmission and less than those for transoceanic cable

On earth the compact reactors could be handily used when completely unattended sources power are required such as in Ar weather stations, remote radio b cons, navigation links, communi tions stations and underwater so nets

The technology which went i SNAP 2 may also be used to bu a portable power plant that co be transported by truck thus s

Gravity May Be Weakening, Scientists Say

SOME SCIENTISTS BELIEVE that gravity the force that hold the world togeth er may be getting weaker

If so everybody is losing weight the easiest possible way Unfortunately the loss cannot be verified on bathroom scales Even in a year the decrease would be far less than a mil lionth of a pound

Speculation that gravity may be diminishing began more than two de cades ago It has been theorized that a weakening of gravity will cause the earth s circumference to grow slightly larger every year widening cracks in the outer shell of the planet The ar gument is strengthened by the recent discovery that one single fracture 45 000 miles long encircles the globe the National Geographic Society says

Scientists are eager to learn about gravity because it is the force that rockets and space ships must overcome to start their journeys And gravity— the attraction of the earth s center for other masses—is a manifestation of gravitation one of the most important powers in the universe Every bit of matter attracts every other b t w the tiniest grain of sand exerting pull on the most distant star

The National Bureau of Standa is attempting to measure gravity w greater precision by dropping a qua rod down an airless tube Scienti crisscross the globe with gravity m ters to test the pull at various poi

These meters measure gravity gals so called in honor of Gali and break the measurements down milligals Readings vary slightly a cording to the earth s compositi n fact valuable to geologists

• • •

Gravity is strongest at the p because the earth is somewhat f tened there and thus the surface closer to the center of the ear Gravity is weakest at the equat particularly in equatorial mounta because of increased distance from t earth s center and the centrifugal fo generated by the earth's spinning fat man can lose perhaps half a pou by moving from Washington to Qu Ecuador

New York's International Airport
covers 4 900 acres
has 22 725 employees

Idlewild: Gateway To The World

by Bill Ballantine

Condensed from Cosmopolitan



Control Tower

ERICA's greatest aerial gateway New York's International Air better known as Idlewild has rown its adolescence and has in years become the world's busi airport

Last year the huge terminal han 214 298 flights carrying 6 994 passengers—a daily average of e than 19 000 persons

In the past ten years Idlewild's o enger traffic has increased slight more than 31 times Cargo weight increased from nine million in 1949 to 207 million last ear Idlewild's airmail business has up too — from about 2 million und to 63 million To handle this alanche of airborne business 725 workers are employed at the field (annual payroll $153 000 0)

Within a dozen years air travel become the leading means of n portation between nations In 58 for the first time more people crossed the Atlantic in planes than on steamships Now the Jet Age is here and Idlewild is ready for it thanks to sagacious planning by The Port of New York Authority the bi state agency that operates the huge airdrome

If you've not been to Idlewild Airport for a year or so you'll be astonished to see how it has changed On what was once an expanse of tideland marsh flats a community of ultramodern architecture has been created

Construction cost alone is expected to exceed a third of a billion dollars Figures and cost tags on a few of the existing installations give some idea of the immensity of the undertaking A cargo center that covers 80 acres and has 300 000 square feet of floor space cost $5,300 000 A central heating refrigeration plant cost $7 0

The most significant Idlewild's renovation tionary plan of nals a scheme that

Reprinted from Cosmopolitan ... © Hearst ... York

future traffic which forecasters have spotted at 12 million annually by 1965

655 Acre Village

A single terminal capable of handling such a traveler horde would need to snake out to an ungainly length — something like two miles Therefore Idlewild s planners have created a distinctive passenger area, a 655 acre terminal village within the 4 900 acre city of Idlewild In this compound major U S airlines will carry on operations from their own buildings foreign flag lines will operate from the two large wing buildings and a union terminal will house the rest of the airlines The area s official title is Terminal City Already in business on Terminal City s perimeter are the travel temples of several large United States Airlines

Still very much in evidence—as frenetic untidy and claustrophobic as ever — is that much-castigated rabbit warren the Temporary Terminal Building ('temporary since 1947) Eventually, this barrackslike eyesore will yield to progress and be replaced by a new union terminal

Leading landmark of Terminal City and focus of the entire airport is the International Arrivals Building IAB to Idlewild s workers Here are located the United States Health Customs and Immigration Naturalization Services and in the two Wing Buildings are the passenger depots of twenty of Idlewild s 22 foreign flag airlines

IAB is an avant garde three story affair of steel concrete, glazed br and glass Its central main l sports an enormous, heavily l tressed parabolic roof surfaced w stainless steel and there are two l Wing Buildings — east and w The whole affair has a frontal stre — wingtip to wingtip — of 11 blocks

To the west of the IAB, steel p lins and l ing posts for the constr ing of Pan American World Airw new $10 million terminal stab sky The unique toadstoollike, ca suspended construction has b given the nickname 'umbrella minal

An 89 foot wide air curtain take the place of entrance door the glass enclosed main concours this three level air depot Jetli will nose under the overhang of cantilevered four acre roof to passengers complete weather p tection

The excitement aroused by l Am s mammoth bumbershoot will augmented by the new $12 mill terminal of Trans World Airl (TWA) now coming in on the IA east flank TWA's contribution startling concept in concrete (by tinguished architect Eero Saarin of functional realities of the jet with the esthetic drama of flig slated to be finished by 1961 Saarinen s creation is a 'see thro building with great expanses of g tying the lofty wingtips to en

Opposite the IAB on the far s of Terminal City is American lines new terminal large enough process 4 million passengers a

a'ile to service 16 jets simultane-

o the south is United Air Lines' t ne new terminal a completely nditioned crescent of alumi and gla s It can accommodate thousand passengers daily and e 13 DC 8 jets as well as four n prop aircraft at one time

lern Air Lines new home built a concrete-capped forest of six and 50 foot pilings is the larg passenger terminal for a single ne in existence

iding it over all is Idlewild s r l tower, a stern rectangular reacher of steel and glass 11 s high Its tenth floor observa deck offers a spectacular view of entire layout

rom the bevy of windows all of ld s most important buildings, ated by a weave of concrete ways that skirt oddly shaped en islands studded with infant s and hemlocks, are easily iden The roads are bordered by ful lute-shaped lamp posts rom the center of a huge circu pool a 916 jet fountain soars to ht of 60 feet

broad foot bridge leads from the r into the IAB's mezzanine re public lounges are on eye level a stupendous Alexander Calder e a delicately balanced cluster colored metal paddles that floats y in the upper reaches of the ding s arched main hall

n this area the IAB's shops lure traveler with a plethora of serv and accessories

Customs Service operates what it calls a "supermarket sys tem " Incoming travelers bring their baggage by market hand cart to one of 72 stainless steel check out count ers for brisk, brief inspection This routine which used to keep arrivees fuming for hours, now is often com pleted in less than ten minutes

Deplaning passengers are never mixed with those enplaning from the Arrival Building s foreign flag de pots which occupy the bulk of the building s space Departing travel ers are the world s most pampered for the international carriers seek ing to outdo each other in the ele gance of their passenger waiting rooms and ground accommoda tions have created ticket offices and lounges that are havens of heavenly comfort

Gold Plated Phones

At roof level is Idlewild s most ornate restaurant The Golden Door It maintains a Sommelier Club for noted air travelers and has gold plated telephones that allow free calls to all airlines Its menu a broadside as large as a small table-cloth is illustrated in full color and printed in six languages (English French Dutch, Spanish, Italian, and Russian)

The Golden Door's great expanse of windows gives an unobstructed view of three runways. For non diners there are ten-cent turnstiles outside this splendid eating house that lead to a 4,000 foot long obser vation deck

Sightseers scrambling over wild find its size and archi

mighty impressive, but they are really delighted to discover the small city of Idlewild and its citizens For instance, there s a chapel, Our Lady of the Skies looked after by a mon ignor from a nearby Queens parish Regular masses are held and many have found it a romantic place to be wed

Ground has been brol en for a Jew i h Synagogue and a Protestant chapel is bein planned There is a full size bank with several branches, a barber shop dry cleaning estab li hment laundry haberdashery, florist and a newspaper I *iation News*

A great many people reside temporarily at Idlewild City s International Hotel the only hotel in the world actually located on an airport This pleasant caravansary special izes in small conventions sales meet ings and honeymoons

Air Fares Lower

In 1954 the average number of passengers per airplane w is 13 to day it is 31 The average miles flown per air traveler 15 years back was 547 today 615 People are not only flying more often but farther—and for less money A comparison of fares between the years 1948 and 1959 shows a reduction of 26 6 per cent in the lowest available standard ansatlantic fare — from $350 to

r millions of people flying has a conventional method of l rather than a derring do ad ture fraught with peril Last year 11 s scheduled airlines flew 96 million passengers a sta er 1,875 000 000 miles (this d es include the figures for air re of U S S R and the People s Repu of China)

Air cargo is still only a drop in

freight carriers the other t o Pan Am and Seaboard & We t has transported the U S Fque t team of 12 horses four grooms five riders in one cargo plane once carried 42 farm animal—i ers sheep and pigs—to Nepal single plane

The big drink between us Europe no longer seems s 650 r wide Los Angeles is but a six nonstop hop from New York Jet flight means four and half s tional hours to Hawaii Paris s hours from Idlewild London and one half

United States airlines have o der into 1962 a total of 232 pure and 81 turboprop jets the bill be roughly $2 500 000 000 in ing supporting ground equipme

Safety Measures

Public security and safet guarded day and night by Idle 85 man police force which matically becomes a fire depa during emergencies Four I trucks (fire foam carbon d roll on every alert from the C Tower (1 171 alerts in 19 meet any returning plane ir tive of the seriou ness of the t Three of the trucks each hol

ns of water, 90 gallons of foam. fourth, called the ' nurse truck," es the reserve 2 500 gallons of er 250 gallons of foam

Idlewild s cops made only 110 ar in 1959 There were no mur at the airport only five cases felonious assault and 23 dead on als Traffic summonses 8 280 for parking the others for ders caught bv radar patrol

To Its Heart

e heart of Idlewild is the upper es of its Control Tower Oper bv the newly created F A A eral Aviation Agency) it is wild s supreme authority Its n man shifts (plus a corps of ees) are not overawed bv their nsibilities neither do they re them lightly They simply face h task calmly and coolly with a fidence born of long experience trust in their fellow workers

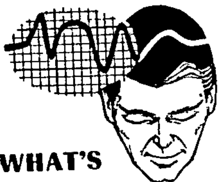
More than a million dollars is in ted in the electronics equipment the tower and three separate rces of electrical power in ure un interrupted operation of the complex network, which is permanently staffed by 65 electronic and air traffic control experts

The jobs are too tough for women Too much bucking the male animal all the time explained one of the supervisors And too many precise decisions This job would kill a woman It s too difficult for many a man

Ground control is handled from the topmost level of the tower called the cab an octagonal room en closed on all sides by a double wall of thick well stressed glass of glare lessening pale green

A few floors below is the Instru ment Flight Rules room where seven men sitting in the semidarkness be fore twinkling radar screens track approaching planes and bring them safely to roost

From the control tower planes are sent to the far corners of the world Far corners? There are no more far corners The world is truly round at last thanks to the jets—and Idle wild



WHAT'S ON YOUR MIND ?

THE RIGID RULES OF THE OFFICE CASTE SYSTEM

Offices are ruled by rigid unwritten rules of protocol which freeze workers into castes then reach beyond the office to affect their families' says the magazine *Modern Office Procedures,* which bases the statement on an extensive survey

'The caste system deeply entrenched, mocks one of business s oldest legends that a company is one big happy family," the magazine continues "This threadbare tradition is chanted with steady repetition Companies say it, print it, lip-serve it, but don't believe it"

Modern Office Procedures quotes one executive as saying "You ve got to have discipline in a company Someone has to give orders someone has to take them If the relation between supervi or and subordinate is fettered by friend hip the company loses"

The office caste system is hardest on supervisors newly promoted from anks They must sever their friendships with their former co workers Says the per onnel directo of a large company, "If a man che ishes his old friendships he d bett not take the promotion

The caste system also applies supervisors' wives and familie O executive said The wife has choice She can be downright da gerous if she insists on keepin cl friends with the wives of her h band s subordinates Her frien l h will rub off on him color his ju ment about the people under h jeopardize his job'

A personnel man states 'W parents drift away from for friends l ids go too Parents d say to them 'You're too good to p with Johnny now' but the fath new title and income make Joh undesirable

The magazine lists seven st based on the composite experien many management men by whi new supervisor can break away his former friends



"1 Make the break graduall a supervisor snaps the cord to he ll build resentment

'2 Find logical excuses fo joining the group at coffee bre lunch

"3 Mi s the department b or card sessions occasionally a then more frequently

5 Accept invitations at first to s homes but reciprocate with group invitations Then at all

3 Give employees the chance to away from the supervisor A withdrawal from depart activities by the supervisor lets do it painlessly

6 Give wives more time to pull from friendships with her hus ds subordinates 'They don't stand the protocol of office or- zation a department head says, cause they aren t exposed to it h Let them make the transition e slowly

7 Reduce all contact eventually office hours But at all times be ful to everyone in the depart nt impartially"

ISOLATION BEHAVIOR

A normal person can be expected display neurotic behavior after as e as three hours in isolation ac ding to Dr Robert L Vosburg, Pittsburgh psychiatrist

Doctor Vosburg reported on an nent where 15 volunteers placed individually in a sound room Outside noises were minated, and sounds made within e room were absorbed by the walls aking them muffled and difficult to calize

The net effect of the experimen l setting was to confront the sub ct with an ambiguous and strange uation and to deprive him of the dinary ways to test reality, namely sense it to explore it and to com pare ideas and feelings about it with another human being, Dr Vosburg said

Each subject was in the room for three hours During the first hour the subject lay in darkness and silence During one of the remain ing two hours a shielded light was turned on During the other hour the light was turned off and a small motor was turned on



Doctor Vosburg said "The ex periment evoked thinking and im agery that had it occurred in an ordinary setting, would be called 'irrational'"

A number of volunteers said they heard 'falling rain' 'a fly buzzing a bell ringing" and "a humming like 20 000 bees' when there actu ally was no noise in the room Dr Vosburg termed these "unmistak able auditory hallucinations"

The motor's humming noise prompted one subject to complain that it was making her teeth ache Dr Vosburg said this was clearly a case in which emotions were trans formed into physical manifestations

PSYCHIATRIST LISTS "ACCIDENT-PRONE" ATHLETES

Doctor Robert A Moore a psy chiatry instructor at the Univer of Michigan Medical Center h four major danger signals that

the clues are not strong incidental uh even though brief may in uence the tone of the general per p on of the pictures meaning

CK OF ADEQUATE DEVELOPMENT N CAUSE ILLNESS

The concern women of all ages rt cularly teen agers have over the men ions of their bosoms can have pronounced effect on the individ ls social and emotional behavior an effect that can lead to illness d Dr Edward R Pinckney an ernal medicine specialist of Bev y Hills California

In an editorial in the *New Physi n official* journal of the Student nerican Medical Assn Dr Pinck y said As a sign of our times e d mensions of women are re rded on almost every page of our wspapers and magazines given minence in the movies and on evisi n and have even become a ular topic for conversation

The young girl between 9 and is a competitive individual Dr ckney continued and her great concern is with her appearance the need to be 'average' There in our day and age it is a thy sign when such a girl or her nts consults a physician regard small breasts

If no congenital hormonal or itional cause is found and if the hic factor seems within reason the matter has been discu sed the patient and parents the ac nce of a soft lled rubber is the simples ccord specialist

TELEVISED HYPNOSIS CAN BE DANGEROUS

Televi ed demonstrations of hyp nosis can trigger serious emotion il reactions the American Academy of General Practice warned

Doctor Paul Read chairman of the Academy s Commission on Pub lic Policy said that closed circuit studies conducted by the British Broadcasting Corp have shown that viewers thousands of miles away can be hypnotized while watching TV demonstrations The victims Dr Read added may later require cor rective psychotherapy



The Academy urged that medical associations and national televi ion networks establish ground rules to eliminate television trance induc tions

In addition the commission rec ommended that hypnosis not be used for entertainment purpo es and that it not be mentioned or re arded as the answer to common emoti nal problems

Doctor Read pointed out that hypnosi mu t be considered a ps chiatric too l and only part of total psychiatric care He al o deplored the current parlor hypno is fad

Only pe ple who have had a le quate special training at accred ted sch ols or universities should a temp t to induce a hypnotic trance

show when athletes are 'accident prone'

1 Athletic ability is grossly out of proportion to the individual s willingness to be aggressive

2 A boy's aggressiveness or ability, is out of line with that of his father

3 An athlete is overly aggressive and lacks sufficient control of himself

4 A boy is overly timid

A boy who wants so badly to play but hasn t much ability or a boy with loads of ability who doesn t want to play very badly are both candidates for accidents Dr Moore said



An athletic father who pushes his not too capable son into sports creates a hazard he said But it s just as dangerous when a boy s ability is much greater than his father s This puts him in the potentially frightening situation of defeating his father"

The too aggressive player 'may rush blindly into the foray so he and his opponent are stretched out on the turf And the overly timid may halt before being tackled and is likely to suffer greater injury on contact

The boys I am talking about are not psychiatric patients Dr Moore emphasized

SUBLIMINAL WORDS CAN SOMETIMES INFLUENCE FEELINGS

Under certain conditions subli nal techniques may strengthen way observers feel about what t see two University of California searchers have found

Psychologists Dr Michael Gc stein and Dr Richard Barthol perimented with subliminal stin among groups of college students

One group was shown slides of man figures engaged in some sort activity Positive words such *success laugh happy*, and *lo e* w briefly superimposed on some of slides

In another group negative wo such as *failure cry angry* and were superimposed on the slides

The same experiments were peated in other groups with sl out of focus so that they were fu but human figures were still ide fiable

Students in all groups were as to tell a story about each slide stories were tape recorded

Analysis of the stories indica that in groups viewing slides in fo there was no apparent subliminal fluence on stories about the sl Among those viewing fuzzy sl there was an influence with the p tive group telling positively to stories and vice versa Subjects not recall seeing the briefly super posed words

The UCLA psychologists int preted these results to mean t when people are viewing pictu with strong visual clues subliml messa es do not get through I

He is also one of the few weather observers who believe that atomic and hydrogen bomb testing has an effect on the world's weather

A tall snowy haired man slightly stooped with his 88 years Dr Abbot is primarily a physicist He studied at the Massachusetts Institute of Technology before coming to the Smithsonian in 1895 He is a down earth scientist who would *not* predict the weather 24 hours in advance if he did not believe he stood on good scientific ground

But while he has kept his feet on the ground Abbot's eyes have been on the sun and in following it all over the world he has seen seven total eclipses and visited most of the isolated stations maintained over a year period for *solar observation* by the Smithsonian

THESE STATIONS accumulated an immense store of data from daily readings of the sun's energy of radiation and it was the doctor's analysis of this data that resulted in his official entry into the field of weather forecasting

He studied the data for years and ... the sun's heat varies over a range of 2 percent Through these studies I found a family of regular periods all relating to 22¾ years or 273 months' he says 'There were periods which were exact submultiples of 273 much as we have harmonics in musical sounds I was interested to see if these related to weather and I found that they

With few exceptions Dr Abbot says meteorologists who have also noted these variations have considered them too small to affect weather But Dr Abbot says, to ignore the sun factor in weather is like the playing of *Hamlet* with Hamlet's part omitted

The relationship of the 273 month cycles to weather appeared so satisfactory on first inspection that the doctor decided to try some forecasting—but in a backward direction He chose an American city with well documented weather records for many years back St Louis He studied the records from 1854 to 1957 and in them he found the same 273 month cycle as well as the related shorter periods But they were magnified in precipitation by variations of as much as 40 per cent above and below the normal rate

The doctor worked tediously for three more years plotting curves and making his 'backcasts' to test his theory against what actually happened He plotted the 273 month cycles and their harmonics making corrections for factors that tend to affect transparency of the earth's atmosphere These include population growth industrial expansion increase in oil burning devices and deforestation

Then he plotted a graph of what actually occurred and put the two together on a 25 foot scroll co the 103 year period For out of the 103 his curv closely the record of

One of the int brought to light w

mospheric disturbances and great wars have always shown up as variations in the 273 month cycle as far as weather is concerned The expected peaks and valleys still occur but in unusual times such as these the record of events falls out of step with the predictions

The two world wars produced this effect as did the explosion of the volcano Krakatoa in 1883 which sent a cloud of dust circling the globe for years There was another disturbance in 1952 which Dr Abbot attributes to widespread nuclear bomb testing and the Korean war

THIS IS NOT the first system Dr Abbot has devised for predicting weather on the basis of repetitive cycles In 1942 he gained some note around Washington by printing a monthly leaflet forecasting the weather on a 27 day cycle It was so accurate that he was called on to forecast a month in advance weather conditions for the inauguration of President Roosevelt in 1945 and President Truman in 1949 He predicted fair weather both times and scored perfectly

In one summer 14 brides asked him to forecast weather for their

did resort owners He continued these short range predictions until 1952 when he says the system seemed to fall apart He says it may have been due to hydrogen and r bomb testing but adds ' I

don t think they will affect the lor range picture much Ten years w have to pass before we can tell

Doctor Abbot was consulted engineers on the Tennessee Vall Authority project who wanted know what the rainfall was go ng be like in certain seasons since ra would affect the job and the num of men needed The doctor made quick study of the area and pred ed that rainfall for the period wou be 84 percent of normal As it turn out it was 87 percent normal

In January 1948 in Washingt Dr Abbot selected 55 specific da for the year when he said tempe tures would drop to a minimum th start rising again This was one his early attempts to apply his sy tem to temperature forecasting well as rainfall Between the col days he predicted there would warmer days averaging 7 1 degre higher

Then he locked his predictions a safe Early in 1949 the safe w opened by a Smithsonian offic and the predictions were compar with the records Out of the 55 m ma predicted Dr Abbot was rig on 48 The average excess on inte vening days was 6 96 degrees against the predicted 7 1 degrees

Like the forecasts that come fro the U S Weather Bureau Dr Abb notes his carry no guarantees I thinks he can be right at least

sible for the 273 month cycl

I can t prove that it is he ...

s no theory to prove it, even ugh the sun periods are perfectly and were observed simul y at widely separated points both hemispheres This elimi tes the possibility that local weath conditions may have been affect observations of the sun rather the other way around

Now THAT HE has completed his 32-city rainfall project Dr Abbot is applying his system to long ange forecasting of temperatures for 12 American cities A new factor that must be considered here, he says is that the average annual temperature in some areas has risen 1½ degrees since 1910 In this job, the doctor is aided by an electronic computer at Arizona State College

Doctor Abbott now leaves solar observations and short range weath er forecasting to the younger fel lows He still plays golf regularly, but when he wants to see whether or not to take his raingear he con sults his newspaper

PERCENTAGES ABOVE AND BELOW NORMAL PRECIPITATION FOR TWELVE AMERICAN CITIES INCLUDED IN A LONG RANGE FORE CAST OF UNITED STATES PRECIPITATION PUBLISHED MARCH 23 1960 BY THE SMITHSONIAN INSTITUTION WASHINGTON 25 D C

City	1960	1961	1962	1963	1964	1965	1966	1967
Albany N Y	+40	+15	−3	−24	−41	+32	−8	+10
Cincinnati, Ohio	−16	+58	−22	+57	−62	+105	+16	−50
Denver, Colo	+8	+33	−132	−34	+62	+4	+21	+31
Detroit, Mich	+36	+8	−28	−44	−26	−15	+108	−7
Sacramento, Calif *	+76	+6	+22	−49	+8	+123	−56	−1
Salt Lake City, Utah	+31	−54	+16	−29	+11	+54	−1	−46
Spokane, Wash	+72	−34	−28	−23	+125	+31	−5	−1
St Louis, Mo	+20	+72	−100	−40	−38	−44	+34	+41
St. Paul Minn.	+17	+19	−44	−6	+45	−5	−40	+12
Washington, D C	+2	−31	−23	−21	+65	+48	−49	+26
Peoria Ill	+17	+34	−24	+5	+48	−22	+11	
San Bernardino, Calif **	−19	+13	−23	+8	−22	+113	−	

*would apply also to San Francisco

**would

Special Section on–

contact lense[s]

Should you wear them[?]

by Jack Kaplan

IF YOU ARE one of the estimated 90 million people who wear conventional glasses you are considering or will consider the big switch—the change to contact lenses Like most everyone who wears regular glasses you would like to discard them for one reason or another Look Mom! No glasses you'd like to say

The trouble is that you are muddled by the contradictory stuff you read about contact lenses these days For one thing some mighty powerful ballyhoo is put out by a few contact lens manufacturers who claim the optical sky for their products

One firm, for example claims that it can fit lenses for $29 95 in one sitting with "s t sfo

any irritation or discomfort by all persons needing visual correction'

And a third concern states about its contacts "Wear them up to six months without removing

When you read that the Better Business Bureau and the Federal ...de Commission have cracked down on these firms, pointing that their claims are fraudulent conclude that these get rich q... operators in the contact lens ... care more for your buck than your eyes

For another thing however I know that Mary and the office Joe your neighbor, either are ... ing or are being fitted with c... lenses You read glowing pre... counts that the contact lens field ... making rapid strides and that ... 000 000 contact lens wearers ... predicted by 1970'

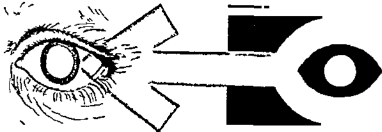
You can t be blamed then ... asking yourself 'How many ... ese claims about contact le... e attributable to the rankest com... mercialism? How much is authe... tic health information that can he... me decide whether contact len... are for me?'

Extraordinary Growth

To begin with it is true that the contact lens field is experiencing ... extraordinary growth travel ... jet propelled pace in the last ... years

In 1950 only 200 000 damn...

(Continued on page 38)



If you lose them...

by *Ruth Boyer Scott*

Y U ARE CONSIDERING contact len es after readin the preceding cle cons der also how to avoid n them

If you re an average loser you ll t from tl e experience of those have lost contact lenses and n formation about in urance on 1

teen age girl we ll call Jane was l with contact lenses Jane t a proverbial loser She and parents decided that $25 a year i urance was too high and they d risk the $150 to $200 cost of ct lenses

ne came home from her first in tion on wearing her contact s and went directly to the bath to remove them Her mother mpanied her

refully Jane put the stopper he wa hbasin — before remov e lens from her right eye and into the right side of her small t lens box Next she started nove the contact lens from her e and suddenly howled in dis ' Mother it's gone! And I I had a ause I could see sharply through my left eye a min ute ago! Mother and daughter made a thorough but unsuccessful search of the bathroom

My lens has to be somewhere! Jane wailed

It must have slipped into your clothing her mother said "Don t move and I ll start searching you She brought a sheet spread it on the floor and had Jane step into the middle of the sheet Then garment by garment she undres ed Jane carefully turning each piece of cloth ing inside out

Still no lens! Jane was almost baby bare and the tears welled into her eyes Her mother handed her a paper handkerchief Jane dabbed at her eyes and suddenly shouted ' I ve found it! Sure enough there was the tiny mi sing lens where it had slipped under her eyelid as she started to remove it'

Don was a happy but nearsighted amateur athlete who loved t s play tennis golf and go with the young crowd at He got contact lenses insurance immediately weeks he was adjusted

(Continued on

had ventured to pay $150 to $300 for these tiny vision aids which float on the natural tear layer of the eye and are invisible to the average on looker

Today the average price still re mains $150 to $300 but according to the Eye Research Foundation of Chicago 6½ million people pur chased—and presumably wore—contact lenses in 1959

Moreover the foundation predicts that by the time 1960 has run its course perhaps 11 million people will have discarded spectacles for contacts

What has caused this big swing to contact lenses which today weigh no more than a feather?

About 85 percent of the men and women who switch to contact lenses make the change for cosmetic reasons —that is for the sake of appearance Take for instance the case of Jane S 'I hate to wear those horribly thick glasses Jane told her optom etrist when she visited him several months ago She went on to say that her strong regular glasses depressed her so much that she rarely ventured out socially

Feeling that Jane's motivation was a strong one the eye specialist prescribed contact lenses Four weeks after she put them on Jane was able to wear her contact glasses without discomfort

Today Jane is a happier girl Con fident of her good looks for the fir time, she gets around a great de now—dates far more frequentl than in the days of her detested ey glasses

Most Wearers Are Women

Inasmuch as over 4 million of a contact lens wearers are wom (practically all in the 15 40 a group) evidently a lot of vanit motivated Janes are around Amo these are actresses and models-Metropolitan Opera's Patrice Mu sel TV s Peggy Cass Hollywood Debra Paget, Deborah Kerr An Sothern and Esther Williams—wl use their contact gadgets for profe sional reasons

But it is no longer true as it w a decade or so ago that the actre model contingent is the largest grou Today secretaries typists and f clerks have discovered that 'Mer as Dorothy Parker observed s dom make passes / At girls who we glasses White collar workers no outnumber by far their glamor g sisters as contact lens wearers

A sizable group has turned contact lenses in recent years f athletic purposes in both amate and professional sports A rece survey of 59 colleges indicated th 161 players wore contact lenses the football field, 63 on the bask ball court, and 91 in other misc laneous sports The entire Den University basketball team we corneal contact lenses as do seve members of the Chicago Bears pr fessional football team So do f gridders Ray Berry and Kyle Ro

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Jack Kaplan of Brooklyn N Y has written many articles on medical and sci entific subjects for national magazines

What's the reason for this shift the athletic fraternity? Because ... lenses follow the eye and absence of spectacles allows 15 more peripheral vision. This ... proven a great advantage in ... counterbalancing the fact ... contacts have been frequently ... dged in the heat of competition. For a considerable number of ... led people contact lenses ... important occupational value because they do not steam up, cloud ... weather changes or streak in the ... Consequently many seamen ... policemen, jet pilots—out... workers in general who work ... up with the weather—have ... to them. So have some sur... who have found steamed up ... ectacles a handicap in the operat... room.

For whatever reasons people turn ... contact lenses those with com... visual defects such as near... htedness benefit most from the ... developments in the field. ... the case of Mrs. R. S. age ... with corneal scars due to child... diseases. So limited was her ... that even with ordinary ... her vision was only 27 ... cent that of normally sighted ... ple. She dared not take a step ... out her glasses nor could she ... her daughter across the ... Finally—after long years of ... treatment—an eye specialist ... her with contact lenses. With ... Mrs. R. S.'s vision ... approaches that of a normally ... sighted person.

Technically speaking, the chief reason for the amazing spurt in contact lens users has been the tremendous improvement in grinding, shaping and fitting the lenses.

Concept Is Not New

Perusing optical history, we find that the *concept* of contact lenses is far from new. The many faceted genius Leonardo da Vinci thought of it as early as 1508 and by 1887 some German opticians were producing lenses that were evidently effective for short periods.

Their basic lens was a scleral *one*—that is, a piece of glass shaped like an eggshell and covering up the front of the eye, or sclera, lid to lid. Unsafe, uncomfortable and practically impossible to fit properly, scleral lenses were prescribed by eye specialists only as a last resort for visual defects which could not be corrected by ordinary glasses.

This type of lens persisted virtually unchanged for about 50 years. Then a scleral lens of *plastic* was produced in the 1930s. But whether of glass or plastic, these scleral lenses necessitated a special fluid which, after four or five hours, affected the cornea, temporarily reducing vision.

Then scleral lenses of a fluidless type were developed that would allow the wearer's own tears free access to the surface of the eye. These fluidless lenses are still used today for special needs. However, although their ... good, it is not as good as that of corneal lenses.

Experimenters in the

came up with a smaller, more comfortable lens than the scleral type—the corneal lens intended to rest on the window of the colored portion (the iris) of the eye By 1947, corneal lenses only seven sixteenths of an inch across were available Today, the overwhelming majority of contact lens wearers—about 80 percent—are fitted with a tiny corneal lens about one third of an inch across, the size of a cigarette tip

Superior to the scleral type in that they offer relative ease in fitting better cosmetic effect and a wearing time of about 16 hours, corneal contacts have one important disadvantage Their very tininess puts the new wearer through a real obstacle course of petty exasperations (See companion article 'If You Lose Them page 37 this issue — Ed)

Who Should Wear Them

Can you wear contact lenses?

That depends on two things you as an individual and the skill of the specialist who fits you

In general Dr A S Rosenberg, ophthalmologist told *Science Digest* contact lenses are not for anyone with evidence of having prolonged or repeated involvement of the cornea That is to say if you have had a history of disorders like iritis keratitis and conjunctivitis then contacts are inadvisable

Again you may be a person with taut eyelids or a tendency for the mucous membranes lining your lids (the conjunctiva) to be easily irri... you may have glaucoma or cataract formation In the ... stances contact lenses are no... you Nor are they for you i... have the kind of nervous ... strung temperament which wi... be able to adjust to the sens... caused by the lens in your eye

Make no mistake about it ... ever if you fall into these cate... you're in the minority The g... majority of people wearin... can wear contact lenses succes...

But if you are one of this m... ity, you will find that adjustm... contact lenses takes time an... tience For some the 'break ... settling' period is as brief a... or three weeks, for others it m... as long as several months O... average, the patient should be ... to adapt to the lenses in a mo...

Obviously the 'break in o... tling period' is crucial for mo... ple The chances for your em... from this period as a succ... wearer of contacts depend upo... eye specialists call your motiv... The greater your desire or nee... contact lenses the better ... chances For contact lenses ... after all a foreign body so tha... will necessarily experience a c... degree of discomfort while we... them Unless your desire to ... corneal contacts is strong en... you will probably be one of the... mated 15 to 25 percent who ... contacts "too much fuss and bo... after a short trial

Vital too is the skill the p... sional ability of the fitter Co... the case of Mrs C K 2... after wearing spectacles for

decided that she must wear contact lenses. She turned to a contact lens outfit of doubtful professional integrity. Because the optometrist she dealt with hurried the fitting too much, she found the corneal contact lenses he prescribed for her too uncomfortable, too irritating to the eyes. After a while Mrs. C. K. developed an abrasion of the cornea in her right eye. Today her contact lenses are put away in her medicine chest, probably never to be worn again.

So imperative is a proper fitting that the American Academy of Ophthalmology and Otolaryngology and the conservative American Optometric Association are now shaking a strong warning finger at the public to avoid untrained dispensers. "Too many people," says Dr. Rosenberg, "agreeing with these professional bodies, insist on getting a bargain, and they go to commercial outfits not scientifically trained. The result is that they are not fitted properly."

Whatever the problems of the contact lens field, practically all authorities agree that it has come of age. Certainly today it features a number of current developments, discoveries and inventions which promise a healthy and successful future.

One new development is helping many people adapt more readily to contact lenses. One of the biggest problems in the fitting of corneal contacts is the not-so-perfect edge resulting from the hand finishing process. An imperfect edge can irritate the lids riding over the lens, producing unpleasant lid symptoms.

Now a new automatic process—a scientific controlled edge finishing treatment—has removed the irregularity found on the hand finished lens. For the lens wearer, this means that the normal adaptive symptoms—itching and feeling that something is in the eye—is reduced to a minimum.

Specialized Uses

Probably the most significant current development is the progressively more important role that contact lenses are assuming as a sight saver, as an important therapeutic measure to correct visual defects. In addition to being eminently useful for the nearsighted—like Mrs. R. S.—a number of scientific studies give concrete support to the belief that contact lenses can reverse nearsightedness as well as act as a more immediate aid. Contact lenses are also used to help people suffering from astigmatism, farsightedness, cataract removal and trachoma.

Astigmatism is caused by slight irregularities in the curve of the cornea, a condition which causes light rays to pass through the irregular cornea to be bent out of focus so that images become blurred. Contact lenses give a person an artificial spherical cornea [illegible] will fill up the irregul[illegible] cornea so that his vision [illegible] greatly improved.

Contact lenses have [illegible] —or nearly [illegible] ple after [illegible] patients must [illegible]

lens to restore vision 'At least 60 percent of all patients operated on for cataracts Dr Jerome Weiss of Syracuse told a conference of contact lens specialists recently do not get comfortable vision from spectacles The modern contact lens is the only answer to those who have had one eye operated on for cataract"

The battle against trachoma has been given a real forward push by the contact lens field The disease usually results in blindness because the cornea becomes scarred and is like a frosted window The action of modern contact lenses Dr Alden N Haffner Executive Director of the Optometric Center of New York, told *Science Digest* prevents deterioration of vision by guarding against further damage to the cornea At the same time vision may be improved by the nature of the optical properties of the contact lens"

Bifocals Next?

What about bifocal contact lenses —the newest development in the field? Until two years ago it was considered useless to place a reading prescription in the bottom of a contact lens because the tiny plastic disk resting in a shallow bath of tears rotated once or twice a minute Then optometrist Newton K Wesley of Chicago came up with a solu a bifocal contact lens with th tant vision prescription in the ter, enclosed by a surrounding that corrects for closeup rea Rotation consequently make difference

Today all authorities agree bifocal contacts are still in th perimental stage although one mate has it that about 1 000 p here and in England wear Some ophthalmologists—like Rosenberg—think them still practical

Guideposts for You

If you do decide that co lenses are for you then here some guideposts

Be sure mentally that you contact lenses Motivation re ber

Pick someone—an ophthal gist, an optometrist or other c fied eye specialist—who is relia

Make sure that you discuss oughly the matter of care of co lenses with him

Be sure that you are well fitte

'After all' says Dr Rosen of the last point 'fitting is' you must be most careful abou poor fitting is the reason that of people buy contact lenses then put them in their bureaus

Man Lived in South America 10,000 Years Ago

MAN LIVED as a nomad in South America 10 000 years ago perhaps a thousand years earlier than thought ...iously two archeologists of the ...versity of Oklahoma Museum reported Profs William J Mayer O and Robert E Bell said that the covered stone tools and other made objects estimated to be 9 00 10 000 years old in Ecuador

low the elements were named

by Alan D Levy

he names the 102 ments so far discov ed are a conglomeration of words ken from Latin and Greek in the nner of biology names of people d places names of mythological a aters and names of common bstances

Some elements have names which er be one of their properties le some were named through an orance of their true properties

Oxygen is an example of an ele nt given a name through lack of ficient knowledge about it After ph Priestly isolated the gas in 74 Antoine Lavoisier proposed at it be called oxygen (from the reek words oxys acid and gen to born literally mal er of acids) ause Lavoisier was under the taken impression that it was a essary component of all acids e now know that Lavoisier was ong but the name remains as a ute to his work

Lavoisier was not the sort of a an to make one error and let it go t that so he made another less seri ous mistake When Henry Caven di h separated what we now know as hydrogen from other gases in 1766 he burned it in the air and found that water was formed

Since he had done such a good job in naming oxygen Lavoisier came to the fore and pro ... at the new gas be named hydrogen (from the Greek words hy dor water and gen to be born literally maker of wa ter) becau e the gas had the property of forming water when burned in the air The name was adopted and has survived

The fact that Lavoisier reversed the names for hydrogen is the one element common to all acids while oxygen is one of the two components of water has been forgotten

Of course not all of the elements were named for properties they do not possess Two of the elements were given names that show that they were originally mistaken for other substances Cadmium s name is taken from the Greek kadmeia calamine and molybdenum s name is tal en from the Greel molybdos lead for they were believed to be these substances at first

From Greek and Latin

A total of 14 elements take their names from the proper names that ... from the Greeks are

Arsenic—from the Greek word *arsenikon arrhenikon* meaning "yellow pigment because the arseni salts with which the Gree worked were all yellow in

Magnesium—from the Greek *magnesia lithos* meaning ' magnesian stone '

Zinc—the Greek word was z referred simply to the

The Romans gave us the names of the elements *antimony* (Latin *anti monium*) *carbon* (Latin *carbo*), *silicon* (Latin *silicis*) *sodium* (Latin *soda* the Latin word also meant headache remedy indicating that the Romans were familiar with the properties of sodium bicarbonate) and *sulfur* (Latin *sulphurum*)

Anglo-Saxon

The Anglo-Saxons gave us our names for gold iron lead silver and tin all of which were their common names for the metals The French are responsible for manganese their common name for the metal

Platinum also belongs to this group When the Spaniards were pil laging South America they discov ered this metal and called it *platina* meaning little silver because its appearance was similar to that of silver The name was taken into English as platinum

Superstitious Beliefs

Two of the elements take their names through superstitious beliefs about them German miners when mining *cobalt* had their health im periled by the fumes of the arsenic which was also present in the ore Unaware of the true reason for the malady, they blamed it on a goblin or *kobold* and the metal became known by this name which was taken into English as cobalt

The other element which earned its name in this way was *nickel* Many years ago German copper miners would bring up an ore that they thought contained the metal When this ore was smelted they tracted a metal that they bel e to be worthless instead of the p cious copper they sought

They called this metal kup nickel' (from the German wo *kupfer* copper, and *nickel* Nick or demon) because t thought a demon was stealin copper from the ore The word eventually shortened to nickel carried over when the metal found to be an element in 1751

Copper itself is an ancient n that comes to us from the Rom Rome s source of the metal was island of Cyprus and they calle *aes cyprium* (meaning 'from prus) at the beginning then sh ened the name first to *cyprium* later to *cuprum* When the Rom conquered Britain the name carried over there and then t into Anglo Saxon as *copor* f which our name for the metall c ment is derived

Minerals and Rocks

Thirteen of the elements take t names from the minerals and r in which they were discove *aluminum* (found in alum) *bar* (found in the barites) *beryll* (found in beryl) *boron* (foun borax), *calcium* (from the L word *calx calcis* lime in which found) *fluorine* (found in fluor *lithium* (from the Greek *lithos* stone to show it was fo in a rock) *nitrogen* (found nitre) *potassium* (from the Fre word *potasse* meaning potash which it is found) *samarium* (fo

samarskite) *strontium* (found in strontianite) *thorium* (found in thorite) and *zirconium* (found in the semiprecious gem the zircon) are all names in this manner

The name of *bismuth* is believed to have been composed from two German words *weiss* meaning white and *mat* meaning mass (literally a white mass) because of the color of the element

Tungsten had its name derived from Swedish in a similar manner It is a combination of the Swedish words *tung* heavy and *sten* stone It is so named because of its high specific gravity

After Their Properties

Nineteen elements are named in the same manner that biologists use to name new discoveries names of Greek or Latin origin showing one of their properties

Argon—this name is derived from the Greek *argos* inactive to show that it is an inert element

Actinium—this is a radioactive element and its name is taken from the Greek word *aktinos* ray of light in reference to its power of emitting rays

Astatine—this too is a radioactive element and its name is also a reference to this property Its name is derived from the Greek word *astatos* unstable because it breaks down into other elements through radioactive decay

Bromine—the name of this element is derived from the Greek *bromos* bad smell in reference to its pungent odor

Cesium—this name is taken from the Latin *caesius* bluish gray in reference to the color of its spectrum

Chlorine—this name is derived from the Greek *chloros* light green to show the color of the gas

Chromium—because the element has salts with a variety of color its name is derived from the Greek word *chroma* color

Helium—this element was discovered spectroscopically in the sun and its name is taken from the Greek word for sun *helios* because of the way in which it was found

Indium—this name is taken from the Greek word *indikon* indigo because of the violet color of some of its salts

Iodine—the name of this element is derived from the Greek word *iodes* violet like because in the gaseous state it is violet

Iridium—because of the irridescence of its solutions the name of this element was derived from the Latin word *iris iridis* the rainbow

Neon—this name comes from the Greek word *neos* new because it was a new element

Osmium—this element was named for the irritating odor of one of its salts osmium tetroxide name is derived from word *osme* a smell

Phosphorus—because dark this element taken from the Gr *phoros* light bringer

Radium—the was

active element discovered, and its name was derived from the Latin word *radius*, ray, because it emitted rays

Rhodium—the name of this element is derived from the Greek word *rhodon*, a rose because of the rose red color of some of its solutions

Rubidium—the name of this element is derived from the Latin word *rubidus* red because of its red spectral line

Technetium—this element takes its name from the Greek word *technetos* artificial because it was the first example of the creation of a previously unknown element by artificial means

Thallium—this name is derived from the Greek word *thallos* a young shoot because of its green spectral line

Mythological Characters

The element *mercury* was known to the ancients as quicksilver because of its property of being a silver colored liquid As a result of this idea of quickness (actually free flowing liquid) it was named after the Greek god of speed Mercury

Other elements are named in honor of mythological characters also *Promethium* is named after Prometheus a demigod who made man out of ... and supplied him with f... ...*um* takes its name in ... e Titans of Greek ... *num* is named after ...ss Vanadi who ... its ... Many ... miners wou... ...fer the names of they ...

In Honor of Discoverers

Six elements are named in ho... of people, but only one of the... named after its discoverer *Cu*... was named in honor of the Cu... *Einsteinium* in honor of Albert ...stein, *Fermium* in honor of E... Fermi a noted physicist, *Gad*...*ium* in honor of John Gadol... noted chemist and *Mendelevi*... honor of Dmitri Mendelejeff founder of the periodic syste... elements *Gallium's* name is de... from the Latin *gallus* cock a t... lation of the French word *Co*... honor of its discoverer, *Leco*... Boisbaudran

Five elements were given n... to show that they gave great ...culty to their discoverer

Dysprosium—this element ... its name from the Greek *dysprositos* hard to get at

Krypton—this name is de... from the Greek word *krypto*... den

Lanthanum—the name of ... element is derived from the ... word *lanthanein* to lie hidden

Tantalum — this element ... named in an allusion to the ... mythological character Ta... who was punished by the ... who immersed him in wa... to his chin Above were fru... branches however, the wat... fruit receded from him whene... wanted to drink or eat

Xenon—this name is derive... the Greek word *xenos* ... reference to the strange ... is an inert gas) which made ...ing it difficult

The heavenly bodies have five ...nts named after them *Cerium*, ... *palladium*, *plutonium*, ... *uranium* are named after Ceres ...tune Pallas Pluto and Uranus ...ectively

...ace Names

... neteen elements are named ...er places on the earth four of ...e after the same city *Erbium*, ... *yttrium* and *ytterbium* are named after the city of Ytterby Sweden

Americium and *europium* are ...med after the continents of Amer... and Europe *Berkelium* and ...*lifornium* are named after the city ...d state of Berkeley California in ...e United States *Francium* and ...*rmanium* are named respectively ...r France and Germany *Nobelium* ...kes its name from the Nobel In...stitute in Sweden where it was di...scovered and *scandium* takes its name ...m the Scandinavian region

The seven remaining elements in ...his naming group have their names ...erived from the Roman name for ...laces The city or country referred ...by the name is placed next to it in ...he parenthesis *hafnium* (Copen...hagen) *holmium* (Stockholm) *lute*...*tium* (Paris) *polonium* (Poland), ...*henium* (Rhine) *ruthenium* (Rus...sia) and *thulium* (from the Latin *Thule* the northernmost portion of ...he habitable world)

• • •

Some of the elements are named ...n reference to other previously di...scovered elements *Protac*... ...akes its name from the ... word

proto first added to the name of the element actinium because it breaks down into actinium through radioactive decay

Radon an inert gas takes its name from radium from which it is emitted and the *on* ending of all the noble gases *Selenium* from the Greek word *selene* the moon is named for its chemical similarity to *tellurium* which takes its name from the Latin *tellus* the earth *Niobium* which is chemically homologous to tantalum takes its name from mythology Niobe was the mother of Tantalus

The names of the two remaining elements have an interesting etymology In 1885 Carl Auer von Wellsbach split what had then been thought to be an element into two new elements The supposed element had been called *didymium* (from the Greek *didymos* twin) because of its similarity to the element lanthanum One of the new elements was named *neodymium* from the Greek *neos* new plus *dymium* from *didymium*, literally meaning didymium"

The other new element was na *praseodymium* from the Greek *sios*, green, and *dymium*, from *dymium*, literally meaning g *didymium* because its salts green

• • •

Thus we can see that from names of the first 102 chemical ments discovered we have no of predicting what the name of next element will be

Since the periodic table has sp in it for 118 elements we can reasonably sure that 16 more ments will eventually be reveale us But as to what they wil named we can make no prediction

As with parents and their c the problem of choosing a name in the hands of the man or men make the discovery However not a problem that will cause one to lose any sleep for as Sh speare once said 'What's i name?



Approve Sale of Oral Contraceptive

THE U S FOOD AND DRUG Administration has given a drug manufacturer the right to market an oral contraceptive called Enovid

is available by prescription only must be taken by a woman in doses of one a day for 20 days each month

Lee D van Antwerp of the Searle company said the pill has tested on about 1 500 women in United States during the past years He said none of those who lowed exact directions became nant Nor have there been any side effects

• • •

According to Dr Antwerp who stopped taking the pills foun were able to conceive readily

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- 27,352 pages
- 38,654,582 words
- 25,042 illustrations
- 431,250 references and cross references
- 6,134 contributors

the mother The need is for clear guideposts for the medical [illegible] to define when an abor[illegible] is medically necessary

RADIOISOTOPES USED TO [illegible]KT HEART DISEASE

A technique that may make it pos[illegible]e to predict susceptibility to heart [illegible]cks in persons showing no symp[illegible]ms is described by Dr Philip C [illegible]on of Baylor University Hous[illegible]n Texas He injects radioisotopes [illegible] the heart to test the rate at [illegible]ch the blood flows through it [illegible] the diseased heart the blood flow decreased about 50 percent, he [illegible]s

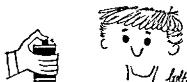
Before the determination of coro[illegible]ry blood flow in the diseased heart [illegible]s involved a hazardous expensive [illegible]ocedure requiring installation of [illegible]bes or catheters into the heart The need for a simpler diagnostic [illegible] has been great Dr Johnson [illegible] this method is simple non harm[illegible]l and no more difficult to obtain [illegible] interpret than a simple x ray [illegible]amination

[illegible]OT STUDY SHOWS MEASLES VACCINE POSSIBLE

Immunity similar to that resulting from a natural case of measles [illegible] been produced by a live virus measles vaccine in a study involving 112 children

Doctor Fred R McCrumb Jr of [illegible]e University of Maryland told the [illegible]ciety for Pediatric Research that [illegible]le there are unsolved problems [illegible]e belief is the problems can be [illegible]lved and that a measles vaccine will be available for large scale use in the future

The vaccine in test use has been administered into the nose and as an aerosol spray These routes were found to be superior to injection into the muscle



Doctor McCrumb noted that while the majority of those vacci nated had a mild infection for a few days there were no complications

EIGHT OF TEN EPILEPTICS CAN HAVE SEIZURES CONTROLLED

It has been said that 50 percent of all epileptics can be assured their attacks can be brought under com plete control This is conservative, in the belief of Dr Howard D Fabing of Cincinnati He believes that more than 80 percent of persons with seizures who are not otherwise incapacitated can now join the rest of the people of our society as "normals"

Epilepsy says Dr [illegible] as old as man and perha[illegible] cau e convulsions can many species which are the human Th[illegible] stance which surface of of the din[illegible] convul[illegible] perim[illegible] "W[illegible]

of Roswell Park Memorial Institute, Buffalo N Y, for they suggest that the human body must contain some natural defenses against cancer

It is conceivable the mysterious ...ing factors may be detected he... Once identified they might be ...ed increased artificially ...ced or even borrowed to help ...who have been attacked by ...cer

...E DRUGS CAUSE ...FOUND JUDGMENT ERRORS

...widely used barbiturate can ...duce profound errors of judg...t when taken in average doses Harvard researchers report

...riting in *The Journal of the ...rican Medical Association* Drs ...M Smith and Henry K ...her said The striking judg...t distortion produced by the ...iturate is particularly impor... from the practical standpoint ...ne can only wonder how many ...ents occurring each year on ...highway, in industry in the ... and elsewhere are due in part ...pairment produced by barbitu... analeptics (stimulants) tran...ers and other drugs given to ...nts they said

...TTING CHILD ...HELP IT

...rologist says that the practice ...king the bed wetting child ...wakefulness at night or drag... out of bed is unfair because ...ets the bed but not the child ...ctor S Richard Muellner of ...rd Medical School says the problem of bed wetting is simply one of dimensions The child's bladder is too small

By age 4½ the child should double the bladder capacity he had at age 2 says Dr Muellner The capacity must increase to about 10 to 12 ounces before the child has a bladder big enough to hold the entire output of night urine and avoid bed wetting

It is foolish to punish the child for something for which he is not responsible the physician advises

"JAGUAR CHEST" IS NEW AILMENT OF DRIVERS

Human beings who are jamming themselves into the new small cars may find themselves suffering from "Jaguar chest" or "Corvette hip," says a Chicago physician



He reports in the *Journal of the American Medical Association* that he has seen four patients in six months who had developed pain in the chest, hip or back a day or two after they began using a small car

The physician Dr Jerome F Strauss Jr said the difficulty is not limited to persons six feet tall ... one of his four patients was ... than 5 feet 10 inches

Abstaining from driving ... while usually relieves the ... Dr Strauss said

JUPITER
the gas giant

by Alan E. Nourse, M.D.

Condensed from a chapter of the book, Nine Planets

SOMETIME within the next half century a fleet of spaceships will be drawing to the end of a remarkable journey.

You — a crewman aboard the spaceship — have been drifting out across the vast gulf of space beyond Mars's orbit, and you know that when you reach your destination— the great planet Jupiter—there will be no warmth and welcome there. Jupiter, beautiful and awesome as it may be, is utterly alien. Mars, the moon, Mercury, even perhaps Venus at least have a superficial resemblance to your home planet.

But Jupiter is different. If you find yourself thinking of this great gas giant as a cold, dispassionate and implacable enemy to be conquered at any cost, it is not surprising. Still, you cannot help wondering what this planet will be like, what may be found on its surface beneath the thick cloud layers.

The four gas giants — Jupiter, Saturn, Uranus and Neptune—are very similar to each other in many details. On the other hand tw[o] the four gas giants, Jupiter [and] Saturn, have families of sate[llites] that are of particular interest.

Earth Is Midget in Compar[ison]

In size alone the gas giants a[re in] a class by themselves. Even [...]

with a diameter of 71,500 m[iles,] even Uranus and Neptune [...] around 32,000 miles in diamete[r,] closer in size to Jupiter than [...] earth.

Yet the density of these [...] planets is surprisingly small f[...] than the density of the earth [...] planets are not balls of solid m[...] orbiting around the sun. The[ir gi]gantic size is the result of a m[...] gaseous atmosphere that cli[ngs to] their surfaces. This blanket [...] is extremely thick and heavy [...] neath it, on each of these [...] there must be a solid core [...] tal, although we cannot be [...] large or small that core [...]

From the book Nine Planets, © by Alan E. Nourse. Reprinted by permission of Harper & Brothers.

Of all gas giants, Jupiter is the ...est Jupiter was seen to have not one satellite like the earth nor even two like Mars, but at least four moons of quite respectable size. New moons have been discovered periodically, until at present no less than 12 moons of Jupiter have been identified.

What we "know" about Jupiter is based almost solely upon what can be observed unfortunately in trying to interpret what they could see astronomers have been forced to draw a whole train of conclusions which may or may not be halfway true about that planet.

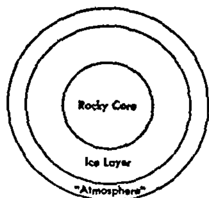
Jupiter is usually visualized as an enormous planet making its slow ponderous way around the sun in an outer orbit carrying its family of satellites along with it.

Because of its size it has been commonly assumed to have a powerful gravitational field. Yet for all its size the best guess at the probable surface gravity on Jupiter is only 2.6 times the earth's surface gravity, hardly a crushing force to contend with.

A more detailed look at what we know about this planet helps to explain the paradox. Jupiter's diameter has been measured at 86,700 miles—approximately 10 times the diameter of the earth. But Jupiter's density is only 1.3 times the density of water, while the earth's is about 5.5. Obviously, what there is of the earth has more substance than Jupiter has.

No one knows just where the surface of "solid" Jupiter begins or what the diameter of its core may be but beyond question the surface is buried beneath thousands upon thousands of miles of furiously turbulent atmospheric gas.

It is this atmosphere and merely the outer layers of it at that, that astronomers have been able to observe.



A model of Jupiter according to Dr. *Rupert Wildt, of Yale University*

Most of what we know about the giant planet is based on this. But fortunately this atmosphere is not the blank featureless blur that Venus's atmospheric blanket is.

For one thing the planet seems to be banded with light and dark stripes which change in width and position from time to time. There is no question that these bands on Jupiter are atmospheric markings or cloud layers. The *albedo* (measurement of a planet's reflectivity) of the planet alone tells us that Jup... a planet covered with a thick ...tive, gaseous atmosphere.

Jupiter's albedo is ...

percent, as compared with Mars's 15 percent and Mercury s 5 5 percent This compares favorably with Venus s albedo of 59 percent and with calculated albedos of the other gas giants Saturn s 42 percent, Uranus s 45 percent and Neptune s 52 percent

"Like Huge Beach Ball"

At first it was thought that these band like markings crossing the face of Jupiter and always lying parallel with the equator were merely the results of a stormy turbulent atmosphere But cert un other things have been observed which suggest that something el e ha a hand

Even with the earliest tele copes it was po sible to see that Jupiter was not a perfect sphere but an oblate spheroid distinctly squashed at the poles and bulging at the equator like a huge striped beach ball that somebody was sitting on

Now there is only one force that can flatten out a planet in quite this fashion and that is the centrifugal force at the equator caused by rotation of the planet on its axis Astronomers concluded that Jupiter *must* be whirling on its axis at a furious rate of speed

Doct r Man I No rse practices medicine in North Ben l Wa h n t n He paid for m st of his medical education by writing magazine stories His books include *So You Want To Be A D tor So You Want To Be A S ...*

This conclusion was suppor very nicely by another odd surfa feature on Jupiter, a prominent fl in the otherwise smooth pattern horizontal bands which came to known as the Great Red Spot

Nobody could explain what t Red Spot really was It was fi noticed in 1878 a huge orange-p blemish on the beach ball in t northern hemi phere elliptical shape and measuring 30 000 mi long and 15 000 miles high

At first indi tinct the Red Sp grew more prominent year af

... face mu ...

with the planet so that a tronom could measure the period of ro tion preci ely

As expected Jupiter was found turn completely on its axis in 9 hours and 55 minutes Then af these figures had been adequate confirmed the Red Spot began to l slightly behind the rotation of Ju ter, and slowly to fade in color It still visible though very pale a since 1890 has shifted in posit throu h about one quarter of Ju ter s circumference

Compared to this furious wh ing on its axis Jupiter s progre around the sun seems ponderou slow Since Jupiter s mean distan from the sun is 483 million miles t total journey in a single circu t some 3 033 000 000 miles long b becau e of Jupiter s greater di tan from the sun it moves only 8 1 m per second on its orbit compared the earth s 18 5 and Mercury s 2

Thus Jupiter requires 11 86 earth years to make a complete circuit of the sun.

he planet s moons revolve nd Jupiter on a totally differ t ne scale, the closest one only 600 miles away makes its cir m about 12 hours while the hest away some 14 880 000 s out from Jupiter speeds nd the giant planet in a little than two years

e e are the things which have observed and measured on this lant its apparent diameter latively light density its thick atmo phere with the surf ce res that are peculiar to it its l of rotation its motion around and the behavior of its fam f moons But these things tell ry little indeed about the na of Jupiter s surface

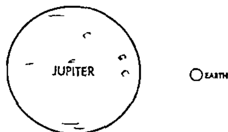
Below Zero

ere are a few other things that been measured however in ratch Thermocouple readings indicated a surface tempera of 210° below zero F and with feeble spark of a sun glowing million miles away we are ed to accept this measurement ue value

pectroscopes have shown up ne lines for hydrogen methane ammonia in Jupiter s atmos a blanket of pure poi on sur ding the planet

y applying what we know we develop a surprisingly good pic of what this giant planet must like

First of all, we can feel quite certain that Jupiter has a surface, some where beneath the layers of cloud filled *atmosphere Sober astron* omers from time to time have toyed with the idea that there might not be any surface that Jupiter might be nothing but a huge gas ball But Jupiter must have a solid core to have a density of 1 34



Comparative sizes of Jupiter and earth

How large is the core, and what is it made of? How deep is the atmos phere around it? Where does the surface begin and how will it appear to our exploring parties, if exploring parties are ever able to land there?

A spaceship attempting to land on Jupiter s surface would be subjected to a frightfully powerful crushing force but it would not be gravity

It would feel the full weight of the atmo phere above it — an atmos phere from 14 000 to 20 000 miles deep bearing down on the ship with a million times the earth s atmos pheric pressure This would be the crushing pressure the ship would have to with tand

We can only guess at what a ship would see at the surfa planet I am ing down th

violently turbulent atmosphere, it would find a thick glacier pack of ice thousands of miles deep and compressed to the hardness of steel under the weight of the atmosphere above it

That glacier pack must long ago have robbed Jupiter s atmosphere of all its water vapor perhaps now is covered by a mash of methane and ammonia snow slush and vapor thousands of miles deep rising to give way to the thick clouds of crystals above

Any ship even a thick heavily reinforced steel capsule would be in danger of being crushed flat as it probed down through the cloudy layers but if it could survive it might well have to sink through oceans of semiliquid methane and ammonia before reaching the solid core

We can be certain that violent changes are going on in the atmosphere at the surface There may be continuous surface upheavals violent electrical storms huge chemical explosions and volcanism

The first goal of a future space ship will be one of the satellites of Jupiter From a base camp on one of the moons drone ships could be sent down to probe the surface of the great planet first through the outer layer of atmosphere then deeper and deeper down toward the surface

What those ships will find we do not know Possibly they will find only a thick ocean of poisonous slush

And if sometime in the future human eyes ever actually look out that surface, they will be starin an inferno a hellish landscape blazing hydrogen fires and boil methane whipped by storms of s violence that our hurricanes on earth will look like gentle breezes comparison — a wild and utt alien place, deadly to the existe of life as we know it and ho til our every attempt to explore exploit it

Is Life Possible?

From what we have seen of gas giants, it might seem fo even to consider the po sibility life existing on Jupiter or Saturn the other massive heavy planets life of some sort could very have developed there

Certainly a basic building ma rial could be found there the n versatile one possible We k there is an abundance of carbor Jupiter combined with hydroge methane gas and probably bound up in carbon dioxide

There is also an excellent uni sal solvent to be found there water all of the water on Ju is undoubtedly frozen solid packed down hard by the atr pheric pressure, and water in solid state is not very useful solvent in the way we underst the term

But the two properties that m water such an excellent solvent use by living organisms in the r temperature range — its ability dissolve at least a tiny bit of ne any other substance, and its ab

dissociate slightly (but only ditly) into ions—are not unique water Other substances also e these critical properties and ll serve as life supporting sol ts in the same fashion as water f all such substances known no r could be more satisfactory un the proper temperature and pres conditions than liquid ammonia s for a pos ible reactant for oxi on reduction reactions Jupiter his oxygen in abundance com l in water to say nothing of ine bromine fluorine sulfur a half dozen other possible can tes

ius we see that all our basic cri are fulfilled But wouldn t the ical conditions we have seen in er—the bitter coldness and the un atmospheric pressure—rule any possibility of life develop here? Certainly they would rule arthlike life surviving by means rthlike chemical reactions

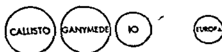
ut we really know very little it the chemistry of extreme cold extreme pressure — conditions cannot reproduce well in Earth ratories A whole body of reac s could conceivably occur under 1 conditions with the help of ropriate catalysts and enzyme ems without our knowledge l these reactions could be the s of Jovian life forms

lut if life has occurred there, we be certain that it is truly an aterrestrial form of life—a form t would be utterly impossible on arth like planet It would have to a life form that wou — un der enormous atmospheric pressures, possibly a creature to which such pressures were absolutely necessary for existence

We could speculate that a life form living under such surface con ditions might more likely be crystal line in structure like certain viruses, than protoplasmic or else equipped with a specially structured proto plasm that was able to thrive in con ditions that would destroy the kinds of protoplasm we know

And Intelligence?

And if the appearance of intelli gence is part of the evolutionary pattern of any life form there would be no reason not to expect intelli gence to have appeared there—but intelligence of quite a different sort from the kind that may have ap peared on Mars



Comparative sizes of four of Jup iter's largest satellites and the earth's moon The other eight sat ellites are too small to be shown on this scale

After all our own intelligence is circumscribed and molded by our physical structure We live in a shallow tenuous atmosphere an obtain our metabolic sus from one of the su bs atmosphere Thus our equipped for respiratic that would be most Jovian life form

likely that such a life form would be equipped to soak up the reacting substances through a broad flat surface area

Similarly we are built long and thin with an endoskeleton supporting a soft warm blanket of protoplasm on Jupiter a life form would more likely have an exceedingly strong exoskeleton to protect any soft parts it happened to have from pressure

But there is no reason whatever to assume any kind of soft parts in a Jovian creature in the sense of muscle nerve or brain tissue Intelligence almost demands an integrated central nervous system with an electrical impulse relay system built in but such a system does not have to be made of soft neurons mushy brain tissue and pliable muscles It could just as well be made of copper wire and porcelain insulators

An organism need not even be mobile to have an integrated nervous system although mobility is one of the characteristics of all intelligent life on this planet The only major immobile life forms on this planet the plants, are not even sentient as far as we can tell much less intelligent

We also believe that such refinements of physical structure as op ...

On Jupiter's surface we can speculate endlessly on the refinements of physical structure that might limit —or enhance—a developing intelligence But whatever we speculate, we can be sure that it would be a alien life form unlike anything th[at] we have ever seen on the earth an[d] perhaps quite radically differe[nt] from anything that we can imagin[e]

If there were intelligent life o[n] Jupiter what awareness could [it] have of the Universe about it?

If we agree that such a creature physical structure — and awarene[ss] — is molded by its environmer[nt] then an intelligent race on Jupi[ter] would have to be as blind to t[he] outside Universe as any creat[ure] arising on Venus But there wou[ld] be a difference A race of Venusi[ans] might break perhaps even by acc[i]dent free of the limits of th[e] planet

There would be every likeliho[od] that an intelligent race on Jupi[ter] would be indigenously planetbour[nd] On earth we had to find a way [to] achieve an escape velocity of [7] miles per second in order to bre[ak] free of our own surface gravity [On] Jupiter the escape velocity would [be] on the order of 37 0 miles per seco[nd]

If we had to face an escape vel[oc]ity of 37 miles per second here [on] earth rather than 7, it is doubt[ful] that we would ever break free of [this] planet's surface We too would [be] a planetbound race Any creat[ure] that originated on Jupiter or Sat[urn] or any of the gas giants would pr[ob]ably never even think of trying [to] leave

There would be no way for it [to] develop the necessary technology [to] take the step into space—unless [of] course another race of creatu[res] came along at some time to help

ECRETS F ANCIENT NGINEERING

by Dr George F Carter

Not even the Indian engineers who built the massive fortress at Ollantaytambo could ever move it again



Inca god, Ai apa

AT OLLANTAYTAMBO near Cuzco, in Peru stones weighing up to 75 tons were moved miles up and down mountains and across a river Then they were carved as if they were no harder than a cake of soap, made to fit subtle curves of bedrock stood on end and slid into a neat tight fit in massive walls How did men do such things a thousand or more years ago?

Early men did this quite frequently The pyramids of Egypt are made of huge stone blocks Stonehenge in England has supercolossal stones Easter Island has outsized stone statues seemingly completely beyond the ability of ill-equipped men to carve and move and set up Did the ancients perhaps have some mysterious lost arts? Not at all!

An engineering study of the problems that the Indians of Peru solved many hundreds of years ago in order to move and carve and erect their gigantic stones shows that the me ods used were age-old mech processes They were skil ployed it is true, but mysterious.

The fortress stands 100 feet above the town of Ollantaytambo. Its huge stones are made of red porphyry. This is our first clue. Where is the nearest red porphyry available? Five miles away, on the other side of the valley, across the sizable Vilcanota River and 2,000 feet above the river, enormous slabs of this kind of rock lie at the foot of a great cliff. These natural slabs were the source of the stones for the fortress.

The skilled Peruvian stone cutters studied their rock, found its natural cleavage plane, determined the shape that they wanted and went to work. Using hard pointed stones they pecked a long V-shaped notch along the line where they wanted the stone to split.

There was no mystery in this process. There was just plenty of hard patient work. Each blow of the hammer stone made a little pit in the surface of the rock. How long would it take to cut a rock in this way?

If we estimate that a workman might strike 50 blows per minute, and that one hundred blows might remove an ounce of rock, then one man would pulverize 30 ounces per hour, or 15 pounds of hard rock in each 8 hour day. In a week, then, each man might well remove nearly 100 pounds of rock. Actually no one seems to know just how muc[h] removed per blow. It is prob[ably] not less than 1⁄100th part of an ou[nce] and it well may be consider[ably] more. On softer rocks it must b[e] been much more than on hard ro[ck].

Doctor George F. Carter, an authority on the origins of American Indian civilizations, has been a member of the Department of Geography, Johns Hopkins University, since 1943, and chairman since 1954.

While the Incas had gained a g[reat] deal by going to a source where [the] stones were already free from bedrock, they paid quite a pri[ce in] the distance that they had to m[ove] the rocks. Perhaps this is fortu[nate,] for this lets us learn how they m[oved] such massive objects.

Work was apparently aband[oned] while in full progress for there [are] partially cut stones at the qu[arry,] stones in transit left where they [were] when work stopped, and a part[ially] built fortress with partially fin[ished] stones sitting within it.

Distribution of the stones tel[ls us] that the Incas used two metho[ds of] transportation. The stones at [the] quarry vary from 75 ton mon[sters] to little things of a mere thr[ee to] five tons.

The large stones are evenly [dis]tributed along the road from [the] quarry to the fortress, but there [are] no small stones along the road. [Ap]parently once a small stone [was] started on its way there we[re no] lengthy stops. This sugge[s]ts [that] they were carried.

"Small stones" weighed up t[o five] tons. To carry such a weight [the] ancients put ropes around it a[nd] the use of long poles made it po[ssible] for large numbers of men to li[ft the] object. It is a bit like carry[ing a] man in a stretcher.

If the 10 000 pounds of a five ton k were distributed so that each n carried 200 pounds of rock and proportionate share of ropes and es it would take 50 men to pick and walk off with one of the e all rocks Apparently this was limit for the larger rocks show rly that they were moved in an er way

t is estimated that the smaller s those weighing only about e or four tons were carried the mile distance 2 000 feet down mountain side and across the r, and to the fortress in one day re were 45 of them at the fortress k to be given their final shapes n work stopped

he larger stones were distributed a zigzag path that led down mountain side to a spot where river could be forded The path 15 feet wide, and the largest e on this path is 20 feet long, 12 feet wide, by three and one feet thick

This 75 ton monster is almost as e as the path Groups of men ll not have walked alongside of struggling with its immense bulk pended on carrying poles Neither ll so great a weight have been ed on sledges Sledge runners ll have plowed into the soft road face But how then?

Engineers reconstruct the problem e this The soft surface requires sort of support They suggest logs were laid down somewhat broad tracks The stone then rolled along on rollers resting these log rails The soft surface

Clay vessel in the form of a head



would then become an advantage, rather than a disadvantage, for the rails would sink into it sufficiently to spread the load out evenly.

The zigzag path becomes understandable also Too steep a track would let the rocky behemoths slide out of control On just the right slope with the rock up on rollers supported by log rails a group of men could ease these huge rocks along by using levers on them

Speed was not the aim Haste makes waste From the moment that the rock was taken in hand the quarry great care was taken to keep it up off the ground so could be moved by levers and When the stone was being was kept up on a pile of that it could be more rea

The formidable

the river was apparently accomplished in the same way. By laying logs down for tracks, and by rollers and ropes and levers, and plenty of manpower the massive blocks could be moved right through the river.

This was a danger point however, and the difficulties that even these master engineers ran into is shown by several great stones embedded in the stream at the ford.

Once the stones had been cut roughly to size carried down hill 2,000 feet brought across a formidable river and brought up hill to the fortress they were shaped to fit the particular spot that they were to occupy in the wall. They were made to fit like a hand in a glove. No mortar was used to fill the chinks and crevices. The stone was simply shaped all over so that it snuggled up to its neighbors. The fit is often so fine that after a thousand years one cannot insert even a knife blade in the crack.

We know how the stone was shaped. It was simply pecked away. We know that once the stone was set in place that it was impossible to lift it out and whittle away a little more. It had to be exactly right on the first try. Just how did the ancient engineers get such complex curved surfaces exactly right? And how did they lift the stone into its final resting place?

An educated guess on the fitting is that casts were made of the surfaces of the rock that the block was to fit. Then the skilled mechanics could cut and try until the surfaces of their block exactly fit the cast. It is an old mechanic's trick to blacken such a negative part as a cast so that when it is tried against the positive part high spots ...

Even if the great stones were r... ing on platforms right by the place that they were to occupy h... were they finally set in place? ... some of the stones there are lu... knobs left on their faces. These m... have been left for the attachment ... ropes, or as projections agai... which levers could be brought in... play.

This last step we understand le... clearly. It must have been a delic... one. The stone had to be ... lifted and finally slid into its ... There could be no slightest mi[s]ta[ke].

Simple isn't it? The methods d... fered slightly at Stonehenge and ... Egypt and on Easter Island but ... greatly. Simple mechanical dev... and well known practices were ... plied with lavish expenditure of t... and man power. It took great sk... fine organization masterful pl... ning and a will to accomplish a purpose.

As the mystery fades away ... admiration of the men of the pa... not diminished at all. Rather ... must recognize that they were m... ters in the ancient and honora... profession of engineering. Po[ss]ess... of no magical lost arts but havi... only the same basic engineering pr... ciples that we still use the ancie... used them with superb skill.

Science Around The World

by Zygmunt Litynski

IN 96 MOST IMPORTANT OBJECT'

.ience grew out of magic and to luce a rabbit out of a hat is still at much enjoyed by theoretical sci ts One of them 39 year old a Charon of France has now per ied such a pectacular act of sci lic legerdemain as to put some he world s best minds hard at l trying to make out whether is science or witchcraft

an engineer graduated from a at university in Paris and a diplo t Charon spent 5 years in Wash ton as science adviser to the nch Embassy More recently as e earcher on atomic fu ion at the nter of Nuclear Studies at Saclay aron has pulled out of his hat the m 96 a nuclear particle with the ghest mass of one thousand million llion millionth of an ounce but so probably the most important ject in the whole univer e for it ay account for almost all universal tion

Charon does not pretend that he h discovered the meson 96 nor m that he has found experimen) any indication of its existence particle burst forth so to speak from a set of equations worked out by the Frenchman with the ambi tious aim of unifying the present dis parate theories of nuclear electro magnetic and gravitational forces

When Charon s unified field the ory first appeared in print in a Swi s scientific magazine at the end of last year it was ignored The attempt to succeed where such giants as Al bert Einstein and Werner Hei en berg had failed seemed somewhat foolhardy on the part of the ob cure physicist Moreover, though his equations tended to simplify all physical sciences Charon s mathe matics were on a level acce sible only to a small group of top experts

The situation changed when more

Zygmunt Litynski was born in Poland and educated in Austria and France He began his career a a pl y i t but early

recently the strange calculations were put to a test by the u e of an electronic brain To everybody s amazement the computer proved that out of Charon s basic *equation of the universe* any nuclear electro magnetic or gravitational constant can be correctly obtained

Then magic stepped in In sciences it is not enough for a new theory to allow us to find out what is already known to be of real value, the theory must predict the unknown This is precisely what Charon has done by deducing from his formula the existence of the meson 96 as a mathematical inevitability

This is where we stand today If Jean Charon s equations are correct the existence of the most important object in the universe is a certainty But also if the meson 96 is now discovered the truth of Charonian physics—as it is already called—will be established And this may mean the beginning of a new era in man s knowledge of nature

FRUIT THAT CURES" ILLS

For about four thousand years amla *(Emblica officinalis)* a medium sized tropical tree with feathery leaves and small greenish yellow flowers clustered along its branches has been known to the populations of Pakistan India and China for its legendary healing properties

Amla s fleshy astringent fruit is said to be antiscorbutic diuretic, laxative and a vermifuge it is prescribed for diarrhea and typhoid fever it serves also to produce a highly appreciated heart and br tonic or a paste which when ext nally applied checks some men diseases when not too far advance it can also be dried and employed an excellent shampoo for the ha

An infusion of amla leaves is us in dysentery or as a pleasant ey wash Gonorrhea is cured by t juice from amla s bark A ferment preparation from amla s roots i co sidered to be helpful in jaundice dyspepsia An infusion of seeds recommended in diabetes bilious fections and palsy An ointment burned seed is widely used ag skin troubles

These and many other medicin qualities known to the Orienta since immemorial times induc Pakistani authorities to have th plant extensively analyzed in Lahore state laboratory as Farru Hassan Shah reports in the *Pakista Journal of Science*

That the tree may possess som really extraordinary propertie proved by the following data res ing from a systematic chemical in vestigation

Dried powdered amla fruit con tains gallic acid ellagic acid glucose phyllembric acid emblicol and fatt matters No alkaloidal or othe physiologically active principle ha been discovered

Juice from fresh amla fruit con tains 20 times as much Vitamin C a orange juice Moreover while he ing drying or storage usually de stroys most of other fruit s Vitam C content in amla fruit it rema intact thanks to some undetec

hani m which prevents its oxi ie de eneration

IT CELL NUCLEUS PHOTOGRAPHED

1 the *Proceedings of the Indian demy of Sciences* M K Subra am of Ban, alore head of the enetics Labor itory of the In Institute of Sciences proudly ents the first photograph ever n of t yeast cell clearly showin, cellul ir nucleus and it chromo er

h ou h prob ibly insignificant to t t u the photogr iph and Sub aniam s accompanying commu tion produced upon a small but dwide group of highly learned the effect of a fin il and irre ible event the end of one era the beginning of another Some h m see the aim of their lives lled to others it is a mort il blow hy all the excitement? Because ong yeastologists a bitter contro sy has raged for well over a hun d years about whether the yeast l has a nucleus or whether it has Ever since Karl Wilhelm von ech in the mid 19th century, med that he had actually seen e nucleus—a statement which was mediately hailed by some and in mantly contested by others— ese gentlemen have been brandish their microscopes and defending eir points of view

Nothing in modern times perhaps h the exception of Albert Ein n s relativity and Percival Low s canals on Mars has caused so ny harsh words in science

Subramaniam s photograph is the outcome of a general attack opened four years ago against the contention that the yeast cell houses its chromosomes within the cellular fluid with out the use of a special membraned nucleus and valiantly carried on against tremendous odds by the Ban galore laboratory

His job done the Indian research er explains now the reason for the confusion Because of limitations of fix ition and staining procedures the yeast cell s nuclear membrane re mains normally invisible It may however become distinguishable —and in this way he has photographed it—when the cells are aged in the malt wort in which they were grown

Another of the innumerable prob lems of nature is thus now solved and classified And as science cannot consider the largeness or smallne s of tasks but only truths and n on truths Subramaniam s apparently trivial discovery brin s us one step further on the long way we have to go

CABBAGE S DREAM COMES TRUE

What is a cabbage dreaming of? If it could speak most certainly its answer would be To receive the proper amount of light—neither less nor more but just the exact mea ure needed for healthy and happy growth

What would be the ideal method of making this dream come true? It surely would be to let the cabbage itself regulate the inten ity of it wishes to have

This is exactly what the R will soon offer their veget

we are to believe a scientific communication in *Selskoye Khozyaistvo* on the achievements of comrade Karmanov, a phytobiologist, expert in light physiology and semiconductors.

What Karmanov has discovered is that plants do actually possess a mechanism by which they desperately signal, though up to now without much avail, whether they need more light or less. It works by reducing vapor pressure on the surface of their leaves when they require more sunshine for their photosynthesis and by building up vapor pressure when they are ready to carry out those life processes which must be performed in complete darkness.

[illegible] the [illegible] these messages and this is [illegible] the much re[illegible] shortage in the Soviet Union. With plants grown in [illegible] [illegible] marked improvement [illegible] [illegible]

stallation functions better th
pected and agrophysicists ar
now putting it into general us

What *Selskoye Khozyaist*
not tell, is what will be the fina
ket price of a Soviet scienti
grown cabbage, after calculati
costs of greenhouses, semic
tors computers, servomecha
wiring, bulbs etc.—not to for
appropriate state reward for
manov for his remarkable
plishment.

FORCE THAT MAKES MATTER LIVE

Another breakthrough
nounced also in France this
biochemistry and physical chem

In a communication presen
the French Academy of Scien
Francis Perrin, Nobel prize
and world authority on atom
molecular physics, three Fren
searchers M. Polonsky, C.
and P. Douzou described the
periments in determining the
which endows chemical sub
with the property of life.

According to their find
force is *ferroelectricity*

serves thus as the information t and al o by acting on the ecules of water as the informa n network. At the same time erted into mechanical energy it ables matter to put into effect the ructions it has itself collected l transmitted

The three researchers cautiously l specifically identifying ferro ctricity with what was at a time ed *vital force*. But this is what r communications seem clearly mply this is also how it was im ately interpreted by a number iologists

n astounding aspect of the ochmen s investigation is the mount importance they assign an obscure phenomenon only erdly considered to be merely a of nature. Ferroelectricity was overed only in 1922 as an anom in Rochelle salt and was given name because of an incorrect gy with ferromagnetism. Then as half forgotten until more re ly when it was rediscovered in w other crystals by students of ctrics

o satisfactory explanation of oelectricity exists at this time A hypothesis was advanced that the phenomenon may occur when mole cules bearing two equal electric charges of opposite signs align them selves so as to give rise to a local electric field the field then increases the molecular alignment and the alignment in turn increases the field. This was compared to the force which allowed Munchausen s soldier to lift himself out of the swamp by his boot straps

Though still the best one we have, the above hypothesis was somewhat shaken when it was calculated that such an interplay of charges and field would at certain temperatures line up molecules in perfect parallel arrays. This is what science knows as the *Mosotti catastrophe*, in this case a disaster of the greatest magni tude for it would solidify all water on earth making life impossible

It is most fortunate for the three French scientists and for the rest of us that in dealing with ferroelectric ity physics or mathematics have proved so far to be erroneous. It provides speculation that something which was considered to be an anom aly of dead substance may turn out to be the long sought secret of life

Microbes Eat Jet Aviation Fuel

ORGS THAT LOVE to dine on jet ion fuel have been found and sci ts are looking for ways to persuade m to desist

aboratory tests have shown that e fungi and bacteria use the kero- ke jet fuels for their own nu- t.

While living in the fuel, the organ isms produce scum, slime and filamen tous material. All this is highly effec tive in clogging filters and tra Dr J hn M Leonard of the N search Laboratory declares gging occurs in st rage and facilities and in the aircraft





Seven causes of BALDNESS AND WHAT TO DO ABOUT THEM

by Irwin I Lubowe, M D

Condensed from a chapter of the book, New Hope For Your Ha r

BALDNESS is on the increase, relatively speaking among the white races It is entirely reasonable to project the responsible estimate that, after puberty, 80 percent of all men and from 15 to 20 percent of all women will suffer a loss of hair ranging from "significant" to "undeniably bald"

Anthropologists have predicted on the basis of current trends, that in a century or so all men will be as bald as Baldwin apples, unless a civilized Utopia emerges My own experience suggests that considering the even more dramatic increase of hair loss among men in recent years about 30 percent of them will be facing the problem of partial or total baldness in the next decade

Doctors and their male patien have heretofore yielded to baldne with a resigned shrug They have r garded the phenomenon as an a of an unassailable, inscrutable fat After all, it produces no physic pain, and no death certificate ev listed "acute baldness" as the cau of demise

No one felt impelled to set up well financed research foundation study the causes and cures of bal ness An appeal for funds for th purpo e would be laughed into e extinction because we have be conditioned for centuries to reg baldness as a subject for high hum Most peculiar about it as they secr ly stifle a stab of chagrin are th baldest of men

The increasing problem of [illegible]

Condensed from the book NEW HOPE FOR YOUR HAIR by Irwin I Lubowe Copyright [illegible] by Irwin I Lubowe Reprinted by permission of E P Dutton & Co [illegible]

women will undoubtedly serve as an great spur to accelerate research. Women they will never patiently endure baldness as some men do. They will agitate, harass, cajole, stimulate and arm twist every relevant branch of scientific research to renewed effective action. They will be an irresistible force hurled against a much less than immovable object.

For the afflicted it may slightly blunt the impact of baldness to learn that it is known scientifically by the impressive term *alopecia*, commonly pronounced alo-pee-sh-ya.

The word will come into more common use with the rising popular awareness that physicians who have heretofore regarded loss of hair as either a hopeless enigma or a col-

baldness yielding to scientific understanding and a knowing approach and proving to have been only temporary after all.

There are broadly five specific types of baldness, identified without respect to their causes and classified largely on the basis of visual appearance (the single exception being the form that usually accompanies advanced age, which rather speaks for itself).

They are:

1. Early baldness (*alopecia prematura*),
2. Patchy baldness (*alopecia areata*),
3. Baldness of the entire scalp (*alopecia totalis*),
4. Baldness of the entire body (*alopecia universalis*),
5. Old age baldness (*alopecia senilis*).

Two categories of baldness, early and old age, are so alike in appearance—regardless of individual variations in extent—that they have recently come to be known as "pattern baldness," a term which is now generally accepted. Because this is the heavily preponderant type of baldness, it merits our foremost consideration.

Pattern Baldness Most Common

It has been responsibly estimated that more than 90 percent of all cases of baldness are of the pattern type. This hair loss state is easily identified: either the frontal hairline starts to move backward, or a vacancy becomes evident on the rear apex of the skull and starts to move gradually forward.

When the process is complete, regardless of whether it started in front or in back, the result is the familiar horseshoe-shaped fringe around the denuded crown. No matter what evasive tactics of combing are adopted to conceal it or modify its appearance, it's still pattern baldness.

Generally speaking, this most common type of baldness gives dermatologists their greatest concern because of its capacity for eluding the efforts of researchers to identify its cause. Pattern baldness is mystifying when its origin seems to lie in heredity. Fortunately, heredity is not its only c

Additional factors contributing to pattern baldness are

1 Excessive dandruff (seborrhea)

2 Nutritional deficiency

3 Scalp infections (such as bacterial)

4 Hormone imbalance

5 Impaired circulation

6 Scalp injury

7 Body infections or diseases

Since these seven factors are direct causes of pattern baldness, and since most of them can be remedied, their accurate diagnosis and skilled treatment offer better than an even chance for regenerating lost hair

As to seborrhea, there can be no doubt that this overactivity of the sebaceous glands which is the most common cause of excessive dandruff, is a prime culprit in baldness

Doctors George Elliot and William Merrill British skin specialists, carried on an intensive study of 344 cases of premature baldness in their office and clinical practice They concluded that 320 cases were associated with seborrheic dermatitis or dandruff They also demonstrated that 203 cases, or 64 percent, occurred before the age of 30 when constitutional and body health are usually at their best, further suggesting that local scalp infections are significant feature

Doctor Irwin I Lubowe practices in New York City, where he is Associate Dermatologist at the Metropolitan Hospital Center and Assistant Dermatologist at the Flower Fifth Avenue Hospital He is the author of *Tell Me The Truth Doctor*

Experiments With Animals

A matter of recent controver has been the revealing disclo ure Dr Peter Flesch of the Univer of Pennsylvania of his laborato experiments with hair growth in a mals He rubbed the fur and skin his animals with squalene, a su stance normally present in sebu the oily secretion in human ha The animals lost hair, leading D Flesch to conclude that it may the excessive sebum which direct causes male pattern baldness

However, Drs R Bloom and Boughton collected sebaceous secr tions from men and women, bo with and without a tendency to m pattern baldness, and found chemical difference in their squale content

Doctors T. R Wood and N Nic laides have gone a step further Th tested the total hair fats of thr limited groups six men, aged 22 30, with normal hair growth and family history of baldness, fo men, aged 24 to 29, with active progressing early male pattern bal ness, and one man of 35 with cor plete baldness, the last five havi family histories of hair loss

They studied the fatty acid squalene, cholesterol, and alcoh factors, but found no difference the relationships of these elemen to the balding process

Doctor T B Hamilton of tl State University Medical Center Brooklyn N Y was one of the fir

ists interested in the field to est that excessive production of androgens the male hormones in important contributory factor pattern baldness This conclusion been fully supported by his ly of males who e capacity to duce androgens is to say the t most limited—namely men have been medically castrated arious ages

n medical eunuchs castrated be the onset of puberty Dr Ham found no loss of scalp hair ever not even the normal reces of the hairline which occurs at t to some small degree in most He observed also a much re ed sebaceous secretion of the p and little or no dandruff

o less striking, however was the that if a eunuch were given reg doses of a male hormone such estosterone propionate progres baldness ensued in most cases il the treatment was terminated

rmones Play Role

The point has been made that if drogens alone were the cause of lness all men would be bald upled with this is the undeniable that brothers will not neces ily be uniformly bald Indeed I J Moynahan the Briti h lo t says that when a bald produces enough sons to pro- a reasonable sampling only half them usually inherit his disposi n to hair loss

The obvious conclusion from this ll be that heredity is only a tial factor in baldness Nevertheless the conclusion could be hasty It is my own observation that the truth is likely to lie somewhere in the middle—that what is inherit ed is a continuous overstimulation of machinery for the production of androgen and also the shape of the skull another factor which influ ences hair growth In eunuchs of course the process of androgen has been surgically interrupted

In women a malfunction or over activity of the adrenal glands and certain ovarian tumors will cause not only loss of scalp hair but other masculinizing effects including ex cessive growth of hair on the face, chest and arms where only men should have it It has been conjec tured too that balding women are likely to have bald fathers

Everyone of course has heard at some time that wearing a hat espe cially a tight hat may contribute to hair thinning or loss Dr Benjamin Dorsey has commented that this practice causes balding and that while the process is slow in the end the tight fitting hat must triumph over a full head of hair

He has described this type of hair loss as traumatic baldness asserting that the tight fitting hat in time compresses and traumatizes the tem poral artery and veins which run al ng the sides of the head perma nently impairing the blood circula tion needed to nourish the growth of the hair

Doctor Dorsey says that heredity is an enormously important in hair growth but for a ferent reason than those

suggested His basic point is that you inherit the shape of your head and it is this bequeathed shape which determines whether you will be happily hirsute or hopelessly hairless

Why Eggheads Are Bald

The distinction is between the long narrow type of head and the oval shaped head The former permits better circulation the blood making its circuit freely especially as it goes over the cranium But at the top of the egghead the blood vessels become pinched and the flow is bl cl ed Dr Dorsey concludes

This could be the whole scientific explanation of the greater prevalence of baldness in relation to eggheaded ne But there is another theory ab ut t which could at least partly compensate the intellectuals

Doctor M Wharton Young the brilliant anatomist at Howard University has offered this theory as one of the conclusions from his study of the anatomical causes of baldness

In brainworkers he writes the brain continues to grow throu h the fifth decade or longer and many intellectuals are bald but idiots and morons are seldom so'

Because the growth of the skull and other external coverings does not keep pace with brain growth says Dr Young in those with larger brains the blood vessels become pinched and provide less nourishment to the hair the tension of the scalp increases and the fatty layer under the scalp thins producing baldness

Then with le s prudence t scientific objectivity Dr Yo dares the wrath of more tha billion females with the ob erv it 'Primitive man was not afflic thus (with baldness) nor do wom with their smaller brains suffer s a fate'

To show further that scalp t sion could cause loss of hair Young removed elliptical sectio from the scalp of monkeys stitched the remainin ed e gether again thus ti htening scalp surface The re ult w pe sistent baldness clo ely re embl the human types

Grandpa and Baby Look Alike

We have discu sed the pattern type of baldne s and the physi logic l causes that have been a vanced for it by respon ible searchers becau e it is by far th most common form of baldnes Mo t of us start life hairles at finish it in a baldin pattern Th baldne s of newborn infant the pattern type, which lead rel tives to remark how much bab looks like Grandpa He does b baby will outgrow the baldne

Pattern baldness is of course matter of degree A method of mea urin such degree has been worke out Dr Hamilton cl ified patients aged 25 to 59 in e graded categories of pattern bal ness

Grades 1 to 3 would not ordinaril have been considered even notice ably balding but there had unques tionably been some hair loss

The ultimate Grade 8 had only horse hoe fringe of hair left The ndards thus established are use for watching the progress of lness or of regrowth

Three months after the 200 heads e first classified they were ex ned again objectively and with any reference to their previous ification Remarkably 199 of m were classified anew exactly as ey had been three months previ ly the sin le exception was rely moved up fr m Grade 3 to ade 4

In his studies Dr Hamilton at mpted to set up a method for nting the number f hairs in dif ent region f the scalp as well of measuring their size and ght In the end however he cluded that this tedious analysis s less u eful than regular in pec n of the scalp as a whole

While pattern baldness afflicts n and women of all ages it is the m that attacks young men most en It will start soon after the h year and the most callous ysician c nnot fail to be affected the emotional distress it creates A young man who detects a per tent hair lo s however slow the ve s should at once seek com te physical and laboratory ex minations for they can turn up ep seated pathological causes ch may hold the answer

Laboratory Checks

Hair loss after all may easily be to d fficulties far removed from scalp itself The examination should be directed to the possible presence of such pertinent organic factors as high blood pressure heart disease liver disorder gastrointesti nal abnormality and altered metab olism

Laboratory checks should include a urinalysis a complete blood count of the hemoglobin red cells and white cells and a hormonal survey The urinalysis should embrace a study of the ketosteroids a high ly complex chemical grouping of steroids in the urine which carries evidence of certain glandular func tions related to hair growth

Since the *production of male hor* mones can be as we have seen so sharply pertinent to premature bald ness there should also be a careful analysis and evaluation of the male and female hormone balance

While it is always possible that in the end all the functional tests will check negatively the least feel ing of despair should be resi ted until the investigation is completed There are now too many known reasons for baldness and too many known means of coping with it to warrant any other initial assumption than marked optimi m

Control and Cure

If dandruff appears to be exces sive as it so often is it may well be seborrhea that is provoking the l of hair and seborrhea is largely sub ject to control and cure Any of a long list of scalp infections may al be at fault—a possibility that sho not be discounted merely bec sym ptoms are qu kly vi

untrained eye A dermatologist can detect and attack them

In the absence of any other suggestive findings, it is even possible in many cases that a local scalp approach will be of value

This treatment consists of what may be called, for purposes of simplicity "combined therapy" Such purely local treatment combines the hormones most often lacking the amino acids primarily responsible for tissue growth oral vasodilators that open the blood vessels to permit freer circulation and rubefacients (chemicals applied to the scalp) that send the blood coursing through those vessels

All these strike at the principal basic causes of failure of growth, and they can be effecti combination even when the vidual elements are not

• • •

One final word at this point as a last ditch resort, the pri most commonly adopted to en age regrowth of hair—close or quent shaving of the affected is quite useless

Cutting or shaving of hair the head, face arms, legs or armpits—does not encourage it growth in the slightest degree incidentally, is a fact which sh put to rest the qualms of wo who have been shaving off unwa hair

Scientists Try to Teach Computer to Hear

ATTEMPTS TO TEACH an electronic brain how to tell one vowel sound from another are being made at Bell Telephone Laboratories

Doctor J D Foulkes says the work is part of a continuing effort to make machines that can hear understand and act on spoken command Many of the sounds humans make when talking are classified as vowels They are such sounds as "a" in date 'ee' in feet 'i' in mine, 'o' in old and 'u' in cube

Humans recognize these sounds correctly regardless of whether they are made by a child talking in a high squeaky voice or a man bellowing in a very deep voice However explaining the difference to a computer is difficult because no electronic 'brain' has the mental abilities of even a s part of the human brain

Doctor Foulkes says that scien think the differences humans hea vowel sounds are due to 'resonanc If you blow in a bottle you hea 'resonant frequency" By blo in two bottles at the same time hear two 'resonances' and their lationship gives the sound a d guishable quality In music such q ities are called major and minor T do not depend on the pitch of notes

Scientists believe relationships tween resonances are responsible the differing sounds of vowels. Bell Labs are trying to classify th relationships in a way that a co puter can handle

nce
tone



by Don el Cohen

STROLOGER mystic and scientific genius Johannes Kepler was of these He earned money cast horoscopes for royalty and he lt a vision of the cosmos based musical tones and ge metric fig ; I rom these far flun specula s he drew laws which changed ts view of the universe

his str in e and intriguin man not born with the proverbial er spoon in his mouth quite the erse Kepler s father Heinrich a mercenary soldier and wan er who once narrowly escaped ng hanged Katherine his mother the daughter of a saloonkeeper her old age was accused of witch ft and nearly burned for the ense Her aunt actually died at stake for being a witch

Johannes was born on December 1571 in Weil de Stadt a free of the Holy German Empire in it is now the southwest portion Western Germany He was a en month child and very delicate infancy he began to manifest of the health troubles which to plague him for the rest of his

Johannes Kepler



the laws of planetary motion

When he was four, Johannes nearly died of smallpox This how ever did not stop his mother who went off to join her wandering hus band in the Netherlands where he was taking part in another war Johannes and his infant brother Heinrich were left in the care of their grandparents for over a year

According to his own testimony, Kepler s youth was a joyless one He attended a series of grim and ri nd schools and his poor health remained a constant source of misery

Life improved for Kepler, in 1589 when he entered the University of Tubingen It was at the University that young Kepler fir t met Michael Maestlin Professor of Astronomy, and the first great influence on h development as a scientist Mae was required to teach astro cording to Ptolemy, that is

sun and planets revolve around the earth. Maestlin however believed in the Copernican system which placed the sun at the center of the solar system. This belief he passed on to his most famous pupil, Johannes Kepler.

Kepler had been a student in the theological school but upon completion of his work early in 1594 he was offered a Professorship of Morals and Mathematics in the Protestant school at Gratz, the capital of Styria in Austria. Lutheran officials at Tubingen respected Kepler's formidable intellectual abilities and admitted that he possessed a deeply religious nature but they felt that his views were too unorthodox to qualify him for a regular church position.

SO THE YOUNG PROFESSOR, age 21, somewhat reluctantly went to Gratz. There he became immensely popular with school officials despite the fact that his enthusiastic rambling lectures bordered on being totally incomprehensible and few students ever bothered to attend them.

The reason for Kepler's popularity was that one of his duties was to prepare an annual calendar of astrological forecasts. This was the traditional job of the Professor of Mathematics at the Austrian school. Kepler was lucky: his first calendar contained some remarkably accurate predictions.

Kepler's attitude towards astrology was a two-sided one. Although he often made astrological predictions and cast horoscopes he held this for pay since he was always in ne of money. He often damned astr ogy, calling it a 'dreadful super tion' and 'the foolish little daug ter of the respectable reasonal mother astronomy.'

On the other hand, he once sa in a letter to a friend: 'Please ta what I wrote you about astrolo seriously. If I remember I ha shown by systematic reflection well as by examples that I do n reject it entirely ... astrology is much more direct use to men (th astronomy).'

During his first years at Gra Kepler began to engage in the co mological speculations upon whi his fame rests. The first fruit these speculations was a book wi the formidable title of *A Forerun to Cosmographical Treatises, co taining the Cosmic Mystery of t admirable proportions between t Heavenly Orbits and the true e proper reasons for the Number Magnitudes and Periodic Mot*

This youthful work was wil poetical, wonderfully imaginat and almost completely wrong. In t *Cosmic Mystery*, Kepler was a tempting to reconcile the new a tr nomical observation with his ow ideas about the harmony and beau of the cosmos. Unfortunately wh factual observations did not fall i line with the geometrical scheme l had so cleverly devised he chose ignore the facts.

About this time Kepler marrie Nothing in life came easily to Ke ler and marriage was no exceptio His bride-to-be was Barbara Mu

von Muhleg a twice widowed ung noblewoman Barbara s pros ts for a third marriage were not good yet her parents at first sed the entreaties of Kepler and friends on the grounds that the hematician s position was too) and his pay insufficient to oly Barbara with the life they she deserved But after long exhausting negotiations a match finally arranged in 1597



er s model of the planetary spheres they appeared in h s first book

Despite his efforts to win her, oler never really seemed to care Barbara He described her as be simple of mind and fat of ly She constantly complained ut the financial hardships she l to endure and Kepler stead ly ignored her complaints

DURING THE LAST YEARS of the 16th century Europe and es ially Germany was torn by re ous conflict which had begun h Martin Luther and resulted in at disastrous and agonizing con t called the Thirty Years War none was affected by the strug Kepler was among the first

Persecutions of Lutherans in the Austrian provinces increased and finally in September of 1598 Kepler and other Protestant intellectual and religious leaders were exiled from Gratz

Kepler was treated with more consideration than many of his fellow Lutherans The Archduke of Austria had been pleased with the astronomer s work and many of Kepler s Catholic friends felt sure that he would convert Although such a move would have made his life easier the idea never seriously entered his mind

Later in life Kepler was to fall into serious trouble with members of the Lutheran clergy but in his own mind he always remained a devout, if somewhat unorthodox Lutheran He wrote 'I am a Christian the Lutheran creed was taught me by my parents I took it unto myself with repeated searchings of its foundations and with daily questionings and I hold fast to it Hypocrisy I have never learnt I am in earnest about Faith and I do not play with it "

Kepler was allowed to return from exile after only a month but he knew that his days in Gratz were numbered and he began searching for a new position He wished to work with the Danish astronomer Tycho Brahe a world renowned observer of the stars and the sessor of the finest collection tronomical in truments in t Over the years Tycho had a m numental amo nt of movements of the stars and

But Tycho with his eye on his future fame guarded his treasure closely while every astronomer in the world including Kepler tried to loosen his hold of it

Tycho had been appointed Imperial Mathematician to Emperor Rudolph II and took up residence near Prague in 1599 There a meeting between the two was arranged

Tycho was already an old man when the two met He had spent a lifetime in painstakingly careful observations of the heavens He had devised his own plan for the solar system and rejected the Copernican view that Kepler subscribed to But Tycho recognized the young German s genius and hoped to use it to enhance his own fame For his part Kepler was not the least interested in Tycho s fame but he was deeply re ted in Tycho s observations

Kepler was never really happy w k n under Tycho The pay was t low the position too lowly and worst of all the careful Dane refused to divulge any more of his treasured observations than he had to But their association was not to last long Eighteen months after Tycho and Kepler first met the great Danish astronomer died A short while later Kepler was appointed Tycho s successor

After Tycho s death Kepler sim I swiped his observation or as he put it "I confess that when Tycho died I quickly took advantage of the absence or lack of circumspection of the heirs by taking the observation under my care, or perhaps usurping them

The next ten years were to be t most productive and trouble free Kepler s life But a trouble free ti for Kepler would have been a peri of endless annoyance and agony most other people There were co stant fights with Tycho s heirs ov Kepler s right to possess the obs vations

KEPLER also had a running fe with the court treasurer fr whom he tried to collect his sal This struggle ended in a draw

Then there were illnes e s real some imaginary for Kepl was a great hypochondriac A from all this Kepler was plagu with the need to cast hor scop and make many other fool h al time consuming astrological pred tions for friends and members of t court

Through it all he still foun t to give a good deal of attention his main scientific speculations publi hed many small works inclu ing an excellent book on opt c 1609 after years of stru le to monev for printing costs le p lished *The New Astronomy* Th great volume contains the first t of Kepler s three planetary la upon which his fame re ts

Kepler s fir t two laws are Planets travel around the sun elliptical orbits with the sun at t focus of each ellip e 2 Planets d not move at a uniform speed b t such a manner that a line draw from the planet to the sun alway sweeps over equal areas in equ time



71 Johannes Kepler 1630

o the modern mind these laws ear deceptively simple but in the ld of 1609 they were revolution and formed the basis of an en ly new concept of the solar tem

Like the first law for example thousands of years men had be ed that the planets moved in cir ar orbits Why should the noble nets choose to move in an undis ushed elliptical path when a fect circle is so much more attrac e and pleasing in the sight of d? Besides circles were good gh for the ancients Thus ran thinking in the early part of the th century While observations of netary motion were still crude d limited circular motion could rhaps be proven But when the mber and accuracy of the obser ns improved the circular orbits an more and more to conflict with ch ervable facts

Copernicus who had thrown out the idea that the sun revolved around the earth could not shake the circles He and many astronomers postulated a wide variety of wheels within wheels to make the facts fit the circles Even after Kepler had expounded his law of elliptical motion as great an astronomer as Galileo refused to accept it and died clinging to the idea of some form of circular motion

The year 1611 was a disastrous one for Kepler Civil War and epidemics brought Prague to a state of near panic In the end his patron and protector Rudolph II abdicated That year also saw the death of Kepler s wife and favorite child

Although Rudolph s successor con firmed Kepler s appointment as Imperial Mathematician the new r had little time for a court a trol and Kepler wh always had culty collecting his salary a felt that he had better get ch His new po n was

orship in Lintz the capital of Upper Austria It was similar to the job he had held at Gratz

Here too Kepler got into trouble His strong but unorthodox religious views resulted in his being excluded from Lutheran Holy Communion services in Lintz This was a serious thing for the astronomer whose social reputation and good standing in the community were considerably hurt by the exclusion

IN 1615 Kepler was forced to undergo still another personal agony His mother was accused of witchcraft The proceedings lasted six years During that time Kepler exhausted himself physically and financially in an attempt to save her Finally in 1621 after the aged woman had been repeatedly imprisoned and threatened with torture he was acquitted and released from prison Six months later she died

The happiest feature of Kepler s personal life during his last 20 years was his second marriage in 1613 He went about choosing a second bride with the same scientific thoroughness with which he discovered his planetary laws

He had 11 candidates to choose from and he carefully listed the qualifications of each one In the end he chose the fifth of the 11 the one girl all his well meaning friends had advised him against

She was Susanna Reuttinger and was 23 at the time of the marriage whereas Kepler was 41 She was an orphan and had been brought up in the household of a baroness where she held a lowly position Kepl choice was an excellent one For remainder of his life he lett barely mention her and since it his habit to reveal all his compl in his correspondence it appe that he got on well with Susan She bore him seven children whom four lived

Despite all his hard times Kep managed to publish a second gr book in 1618 This was *The H mony of the World* In this wo Kepler tried to combine mu geometry and astronomy into grand conception of a sublime a symmetrical universe Almost amid the wildly imaginative ideas Kepler s third law This law sta that squares of the periods of revol tion of any two planets are prop tional to the cubes of their mean d tances from the sun

During this last period in Keple life he published a large number books pamphlets calendars of p dictions and other scientific a pseudo scientific works in order get enough money to keep his fa ily together Among the variety publications are two more excel works *The Epitome Astronom Copernicanae* and *The Rudolph Tables*

The *Rudolphine Tables* were compilation of Tycho s lifelong o servations They were named honor of the Emperor Rudolph who had been both Kepler s a Tycho s patron The tables had be anxiously awaited by scholars ma makers and navigators since Tych death but Kepler was reluctant

the mammoth task of prepar the mass of data for publication On one occasion he wrote I be h thee my friends do not sen e me entirely to the treadmill of hematical computations and e me time for philosophical spec ons which are my only delight t the age of 50 nearly 23 years r Tycho s death Kepler finally led down to serious work on the es By the time they were ready publication The Thirty Years had reduced much of Germany aos and the already difficult job rinting such a complex work was e even more difficult

irst Kepler and his Protestant ters were nearly exiled from z for refusing to embrace the holic faith Because of his fame the important work in which he engaged the astronomer and his were exempted from the gen ban on Lutherans But he was exempt from harassment

1626 the Lutheran peasants rose in revolt and besieged Lintz ally fighting broke out in the n and Kepler s press and all the ets printed up to that time were troyed This did not bother Kep as much as might be expected for had never liked Lintz and was py to find an excuse to leave it Kepler found another printer at m There after the usual fights half hearted reconciliations with sen itive printer *The Tables* finally completed in September, 27

With *The Tables* finally out of the way Kepler was again without a real job He had been offered sev eral excellent positions in other countries but felt he was too old to leave his native land He became private mathematician to Wallen stein the romantic hero of the Thirty Years War But Wallen stein only wanted the famous as tronomer as a showpiece and was not much interested in science Like so many of his other patrons Wallen stein too refused to pay Kepler what he had promised

Fearing poverty and old age Kep- ler took to the road again In Octo- ber 1630 he left Wallenstein s estates in Sagan and borrowed enough money to get to Regensburg, where the Emperor was presiding over the Reichstag He was going to try and collect the 12 000 florins the crown owed him He arrived in Regensburg on November 2 and three days later was stricken with a fever He died on November 15, 1630

He was buried outside the walls of the city The stone carried an in- scription that Kepler himself had composed for the purpose

Once I measured the skies
Now I measure the earth s shadow
Of heavenly birth was the meas uring mind,
In the shadow remains only body

Three years after his deat cemetery outside Regen completely destroyed in the was not until 200 years monument in honor of built at h l al place

The way a person signs his name provides an insight into his character

John Eppingham Gibso

John Gibson

J. Gibson

J. Eppingham Gibson

J. E. Gibson

Your signature shows you up!

by John E. Gibs

Condensed from Today's Health

PSYCHOLOGISTS have found that your name how you feel about it and how you put it down on paper reveal a great deal about your character temperament and general outlook on life Your answers to three simple questions about your name will divulge more than you d suspect Here are the questions After you ve answered them read the analysis which follows and see how the experts have figured you out And after that you can have fun trying the questions on your friends

1 How do you feel about your first name? Do you feel it fits you—or are you dissatisfied with it?

2 Do you have a peculiar sounding first name?

3 How do you sign your name? Which of these forms do you use?

John J Brown
John Brown
John Jacob Brown
J J Brown
J Brown
J Jacob Brown

What Your Answers Indicate

1 Studies conducted at West Virginia Wesleyan College show that your attitude toward your given name reflects your attitude toward yourself The person who is satisfied with his first name tends to be generally pleased but not conceited about being the person he is and feels no need to be a different person But the person who is dissatisfied with his first name tends to be very definitely to be dissatisfied with the kind of person he is and wants very much to be a different kind of person

And similar studies at Columbia University likewise show that people who don t feel that their first names fit them are much more given to self-doubts and self-criticism than people who feel their names are all right

2 Harvard University studies of more than 3,300 persons show that people with peculiar first names tend to have a more difficult time

djusting to the stresses and strains f everyday life than others to be ore sensitive and more subject to notional ups and downs

Other investigations have simi rly shown that a bizarre name can nd frequently does have a direct fect on an individual s personality nd general life outlook For exam le a name which strikes others as queer or strange or lends itself jokes or puns can result in a de nsive chip on the shoulder or an ntisocial attitude This may occur hether the person thinks his name ts him or not

Psychologists point out that par its who foist an odd name on a hild in an attempt to be different y be giving their offspring a diffi ult burden to cope with as he grows p

On the other hand there are some eople who thrive on names which ould prove a decided handicap to thers A leading social researcher tes the case of a well known per onage who feels he gained character by *fighting through life* with the name Percy

"My answer" he says "to those who poke fun at my name is that my mother liked it and that s reason enough why I am always going to use it"

"My son Percy Jr always said that when he had a son he was going to name him Percy because then he would have to fight every day he was in school and that would make a man out of him He now has that son and he is Percy III

Doctor A A Hartman director of psychology and research at the Psychiatric Institute of Chicago's Municipal Court has made an in tensive study of this matter He says the way a person signs his name provides a penetrating insight into his character and personality The following analysis is based on his findings

John J Brown This is the con ventional American name style Its use indicates conformity to social customs and an average conven tional self concept

John Bro n People who use this form tend to be less conventional in their attitudes than those who in clude the middle initial They are likely to be more direct outspoken and individualistic

John Jacob Brown Persons who adopt this name form are inclined to have a high opinion of themselves and their abilities and to enjoy be ing in the limelight The impression they make on others is important to them and they are likely to take pains to insure making a good ap pearance Doctor Hartman notes that when this form is used by per sons who are lacking in self-confi dence it suggests an attempt to bol ster themselves by a demonstrat name display

J J Brown If you use t it indicates restraint Y to keep your feelings and pretty well under wraps fuss and ostentation clined to be reserved

---

Tod y s Hea t (May 1960) © by American [illegible] Association [illegible]
[illegible]

to reveal yourself to few people However, this style may also indicate high energy and impatience, a wish to present only the essentials, a dislike for elaboration

J Brown The use of a single initial has other connotations and is likely to be used by people who are lacking in self reliance and pessimistic about their own abilities It tends to go hand in hand with extreme modesty or a desire to escape notice or attention

J Jacob Brown This style is individualistic and indicates a desire to stand out from the crowd a striving for distinction or superiority People in this category aren t likely to underestimate either themselves or their capabilities

The extent to which you identify yourself with your name also provides an important clue to your personality; that is whether you think of yourself primarily as *yourself*—John Adam says—or whether you think of yourself as an architect, a housewife, or a human being

In a study at the University

you?" The replies ranged fr "Why, I'm John Smith," or 'I m lawyer,' or 'I m an architect' "I'm an American" or "I'm a wo ing man," to 'What do you mean 'who am I?'" and 'Why on ea are you asking me such a question

• • •

The researchers found that t person who thought of themselv primarily in terms of their names who answered "I m John Smith" "Mary Jones" were by far the ha piest and had the best adjusted pe sonalities Such an answer, say t scientists indicates that the indivi ual has a high degree of self awar ness, and is acutely conscious of hi self as a person

And this, of course has a dire bearing on how well adjusted he i and how well he really knows hi self and his innermost wishes a desires

Can't Stick to Diet? It's Hospital For You

cheat on calorie intake

In re examining 161 obesity studies reported in the last 30 years Dr Alvan R Feinstein of New York University College of Medicine found that only those patients who were in a completely restricted environment (usually a) always lost weight pro prescribed calorie cut whether a special

diet pills injections group therapy individual psychiatric help has worke so consistently Dr Feinstein said

Most overweight persons need so sort of watchdog to keep an eye them In many cases the doctor co siders such people a bore He admo ishes them for being fat gives them calorie chart and tells them to eat on so many calories per day

Doctor Feinstein said the obese pe son is chronically ill and should treated accordingly

BOOKS

THE LIVING RIVER by Isaac Asimov (Abelard-Schuman ...

... that keeps each cell supplied with food and air removes wastes carries thousands of chemicals and protects the body against germs and toxins

THE COMMONSENSE BOOK OF DRINKING by Leon D Adams with foreword by Dr Morris Fishbein (David McKay, $3 95) Discusses these and many more questions How much can you hold and stay sober? When are you in danger? Why are martinis deadly? What's the truth about hangovers?

... here ready to use in your own home ... time tested medically approved remedies for some 200 ailments and injuries

NINE PLANETS by Alan E Nourse (Harper $5 95) About the nine planets of our solar system their satellites and their sun and about the wave of exploration of that solar system which ...

THORACIC SURGERY BEFORE THE 20th CENTURY, by Dr Lew A Hochberg with a foreword by Dr Edward D Churchill (Vantage Press, $15 00). The first history of thoracic surgery before the 20th century, complete with 155 rare drawings and illustrations has been written by Dr Hochberg, a Brooklyn, N Y, thoracic surgeon

PLANTS TODAY AND TOMORROW by Margaret O Hyde (Whittlesey House, $3 00) For younger readers this book explains the basic facts about plants and brings the latest information about the exciting frontiers of the plant world

THE STORY OF ENGINEERING by James Kip Finch (Doubleday Anchor $1 45) A paperback original this book offers in outline survey form the story of a profession which for 50 centuries has exercised an increasing influence on the evolution of our way of life

HORNS STRINGS AND HARMONY by Arthur H Benade (Anchor Science Study Series 95 cents) A musician who is also an associate professor of physics at Case Institute of Technology gives a clear and comprehensive account of both the scientific and esthetic nature of music

THE MENTALLY ...

... which will help them to become "informed parents"



(The books listed above are available from Science ... may be obtained from ... ers, and usually, from ...

(Continued from page 37)
his lenses for hours at a stretch and decided to try them in swimming "If they'll stay in place while I swim, it really will be great" he told his friends If—he swam a few strokes under water and came up to find his lenses were gone!

Unfortunately, neither he nor any of his friends could find the tiny clear lenses Then days passed while he waited for replacement lenses, then he had to get adjusted an hour at a time all over again

The newer tiny corneal contact lenses which cover only the curved colored part of the eye, will float off under water As Don learned later, swimmers who really need glasses can have the older type larger contact lenses which cover the front surface of the eye and are held in place by the eyelids

GRANDPA ANDREWS was fitted with contact lenses on the advice of his eye doctor One morning Grandpa felt drowsy after reading the paper took out his contact lenses and put them in their box in his lap He fell asleep and his relaxing arm folded the morning paper down over the tiny box

His daughter tidying up loose papers before the trash man called picked up Grandpa's paper without waking him and put the paper in the trash can

Ruth Boyer Scott a registered nurse and free lance writer has placed articles with leading publications Mrs Scott resides in Bethesda, Md

When Grandpa Andrews aw ened he wanted his contact len Where were they? The whole fam searched the house for them Th hard,' his daughter said Wh was the last time you used them

For the morning paper' he su denly remembered 'I put them my lap when I finished reading i

His dismayed daughter hurr outside to the trash can Minu ahead of the trash man's arrival found the morning paper w Grandpa's contact lens box fold inside!

Even when complete insurance carried prevention of loss of co tact lenses is worth intelligent f sight and faithful safety habits

Briefly the trick is to put yo mind on what you are doing to av putting on or removing lenses locations with obvious danger p such as an open drain a busy stree or grassy field You always sh put them into their special b which should look like a speci box If necessary a large prin label CONTACT, could be fa tened to the top and bottom of th box The box should be kept in o habitually safe place If this place a woman's purse the purse shou be fastened shut Avoid the ope top purse without a fastening fro which a little box may fall out u noticed

Contact lens insurance isn't a ways come by easily Three diffe ent companies have said "We d n want to write contact lens insuranc because a policy always means a re plac

Some insurance companies will [writ]e a policy only for those good [cus]tomers who already carry major [ins]urance with them.

[I]t may seem logical to the indi[vid]ual who has a "Homeowner's [Pol]icy" covering loss of personal [pro]perty away from home that such [a p]olicy should include protection [aga]inst loss of contact lenses. How[eve]r in at least one insurance com[pan]y the statement was made that [con]tact lenses were not included. If [you] have a Homeowner's Policy, ask [for] a written statement in advance [illegible]etting your contact lenses as to [wh]ether they would be covered for [loss].

Many optical firms which prepare [con]tact lenses to your ophthalmolo[gis]t's prescription are able to ar[ran]ge insurance for you. Some write [the]ir own guarantee to replace, [othe]rs use a commercial insurance [co]mpany. The fee may be $15 or $25 a year; at least one company quotes a $40 fee for three years, an appreciable saving over the $25 rate.

However, if the optical firm to which you consider taking your prescription does not have any insurance accommodation, you may find yourself in an awkward situation. Other firms may refuse to insure lenses obtained elsewhere.

Before you decide on insurance, ask the firm which will make up your lenses how much you would be charged to replace one or two lost lenses. The replacement fee will be less than the original cost, probably, and you may decide to carry your own risk of loss because the insurance comes high.

Insured or not insured, if you have strong enough motivation to wear contact lenses, you should add the determination to use your intelligence to prevent their loss!



[illegible] On June 16, 1960 the American [M]edical Association's House of Dele[ga]tes meeting in Miami Beach, Florida [w]ent on record as "viewing with grave [co]ncern the indiscriminate use of con[tac]t lenses. . . . Contact lenses involve [intro]duction of a foreign body to the [deli]cate eye tissue and their application is not just a mechanical procedure [li]ke fitting spectacles. Their use can [lea]d at times to serious permanent [im]pairment of vision." Dr. [illegible]ichard [illegible]asche of the U. S. Army Medical [illegible] advised the delegates.

• • •

[illegible]safety and success in wearing present day contact lenses require three broad ingredients: an intelligent, co-operative, mature patient who has a genuine need for the lenses and can return for reexamination as frequently as deemed advisable; a skillful, well trained technician who in addition is capable of recognizing, handling or immediately referring to an ophthalmologist all complications that may arise and who has time and is willing to follow patients closely to detect difficulties early; and a smoothly constructed and polished lens that is fitted to the individual cornea," Dr. [illegible]asche observed.

(Continued from page 37)
his lenses for hours at a stretch and decided to try them in swimming

"If they'll stay in place while I swim it really will be great," he told his friends. If—he swam a few strokes under water and came up to find his lenses were gone!

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Ruth Boyer Scott, a registered nurse and free lance writer, has placed articles with leading publications. Mrs. Scott resides in Bethesda, Md.

Some insurance companies will write a policy only for those good customers who already carry major insurance with them

It may seem logical to the individual who has a Homeowner's policy covering loss of personal property away from home that such policy should include protection against loss of contact lenses However in at least one insurance company the statement was made that contact lenses were not included If you have a Homeowner's Policy ask for a written statement in advance getting your contact lenses as to whether they would be covered for loss

Many optical firms which prepare contact lenses to your ophthalmologist's prescription are able to arrange insurance for you Some write their own guarantee to replace', others use a commercial insurance company The fee may be $15 or $25 a year, at least one company quotes a $40 fee for three years, an appreciable saving over the $25 rate

However, if the optical firm to which you consider taking your prescription does not have any insurance accommodation, you may find yourself in an awkward situation Other firms may refuse to insure lenses obtained elsewhere

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Insured or not insured if you have strong enough motivation to wear contact lenses you should add the determination to use your intelligence to prevent their loss!



Number of Chromosomes

Sirs

I note in a recent issue that the normal chromosome number in man is 46 not 48. Who discovered this? And when?

JAMES REBOULET
VERSAILLES OHIO

Until 1957 it was generally believed that there were 48 chromosomes but a more careful count by Dr Masuo Kodani of the State University of Iowa showed the count was 46 in the majority of cases —EDITOR

"Wretched Businessmen"

Sirs

Just read "Women Are Wretched Housekeepers" (July issue). I refuse to argue with the mechanical mind of a man—he might be right. I am thankful my household is not a machine though.

By the way some men are wretched businessmen. So what? We love them anyway.

MRS L J WALKER
HUMBLE TEXAS

Correction

Sirs

In your June issue there appeared an article entitled "Learn How To Listen" by Eileen I Daly. This article states that you condensed your article from *This Week* magazine.

Dr Walter Stromer of Cornell College I was his asked me to look into

CEDAR RAPIDS Io

We regret the error which led to omission of the name of Dr Strom professor of speech Cornell Colle —EDI

Life Is Change

Sirs

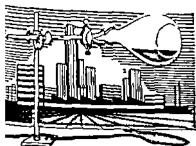
The article "Has Evolution Stopped" (July) is a travesty to science. I rout's view is similar to that of the former head of the patent office who quit his job because he said there

that something will not ... change and evolution. He can't kn what will happen in the future.

All of his arguments are very convincing if you forget to look at the problem from a few paces back. Even if the human doesn't change this is evolution because by natural selection it will be found that man as he is now is ideal and therefore the mutations will not survive.

ALAN F SHAP
BRONX NEW Yo

future (the usual stimulus for evolutionary change) he will use his knowledge and ingenuity to adapt to it rather than undergo bodily evolutionary changes through the process of natural selection' Answering the question Has Evolution Stopped? D... concluded, Yes quite possibly it h... —EDI



INVENTIONS PATENTS PROCESSES

vacar The Land Vehicle at Slides on Air

Engineers are now studying the vacar a revolutionary new land vehicle that may someday travel from ty to city at 500 mph or more sliding a thin film of compressed air

Alex L. Haynes of the Ford Motor ompany said his company has already built experimental levacars and continuing to develop the idea

In operation levacars carrying a umber of passengers are mounted on at topped tracks similar to railroad racks A stream of compressed air is ed to "levapads" which fit around the

start landing at their destination Passengers traveling a few hundred miles may spend much more time traveling

100 mph Any wheeled vehicle the authors said is unsatisfactory for speeds above 150 mph because of excessive vibration and wear

Levacars they continued could travel at speeds of 200 to 500 mph over metal rails that would be cheaper and easier to install than conventional roads and would provide added safety as well This system of sliding on air together with automatic controls they said "is the foundation of safe economical high speed transportation substantially independent of weather conditions"

Fundamentally a levacar is an airplane except that in flying very close to the ground it needs neither wings nor tail surfaces

"Any lightweight engine is satisfactory as a source of power and the same engine can also be used to provide the compressed air for the levapad" the authors concluded

Army Foxhole Digger Weighs 36,000 Pounds

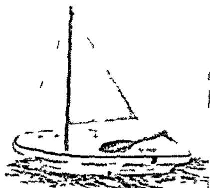
A new machine that digs foxholes in a minute has been developed for the Army but no GI will ever have to carry

a scraper and a discharge conveyor

The machine was developed by the U S Army Research and Development Laboratory at Fort Belvoir Va

Plastic Boat For Ponds and Pools

The plastic Sea Falcon is 61 inches long and will float approximately 250 pounds although the boat itself weighs only 14 pounds



Sea Falcon

Sea Falcon is completely circled by a polyethylene Bumper Float three inches in diameter According to the distributors Wilco Fashions of Rockville Centre New York this creates the floating buoyancy necessary to prevent tipping and insure safety

Manufactured from heavy gauge polyethylene the Sea Falcon is said to be extremely durable

Airlines Testing Air to Ground Phone Service

Executives flying between major U S cities soon may be able to ring up the home office and relay en route reports with the ease of mid-city telephoning Passengers on coast to coast nonstops may be calling home for little more than it costs to talk from a conventional ground based phone boot the magazine *Airlift* reports

Tests of an airborne radio-teleph service have been going on for sev ... lic air to ground operations on a l ited number of radio bands

El Al Israel Airlines recently nounced telephone service along all international routes the magaz noted For $3 to $9 per three min call El Al passengers can talk to a of several dozen ground stations sc tered across the globe

Northwest Airlines one of the Am ican companies participating in the perimental use of air to ground phc service found the service overwhel ingly popular The novelty of maki phone calls from 25 000 feet in t air was no small contributor to pop larity

Northwest passengers made ca from a station in the rear of the a craft In a full scale implementati of a permanent system calls probal would be made directly from passe gers' seats

Three Dimensional Closed Circuit TV System

KIN TEL Division of Cohu Ele tronics Inc of San Diego Calif h developed a three dimensional close circuit television system

The system consists of two standa closed circuit cameras and a mon control console housing two monitoi two camera control units and a sing polarized optical system

The optical system presents the ove lapping images from each camera on single viewing plane with one ima polarized horizontally and one polariz vertically Observation of this ima

ugh glasses or a viewing hood with zontally and vertically polarized is provides three dimensional pic presentation

...ial "Dirt" Devised ...Washing Cream Demonstration

...ecial scientifically created dirt applied to toy cars as part of a ...nstration for S C Johnson & ... Inc new car washing cream ...day

...e artificially dirtied cars a bot...f the new product and a sponge ...cloth were sent to editors of vari...publications for right at the desk ...nstrations

...cording to Johnson s Holiday ...e used without prior washing the ...of a hose is not required After ...ing the cream dries to a haze that ...iped off leaving a bright shine

...ched Tape Stores ...ical Scores

...usical scores may now be stored ...unched tape from which they may ...uplicated by means of a machine ...loped by Composers L A Hiller ...of the University of Illinois and ...l Pfinger of the University of ...rado

... typist can now simultaneously ...ch paper computer tape while print...t musical notations The operation ...milar to that of a typewriter

...Profes or Pfinger is inventor of the ...sicwriter a commercially produced ...ewriter which will print music

...Profe or Hiller is best known as a ...poser for his Illiac Suite a string ...rtet consisting of selections from ...terial produced by the University of ...o high speed computer Illiac ...has also composed numerous more ...entional scores

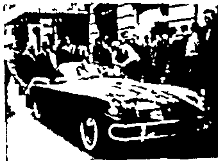
Tape punched on the electronic Musicwriter may be fed back into the machine to print additional copies electrically

This same tape also can be used as input data for a computer such as Illiac so that with proper directions Hiller believes it may be possible for Illiac to extract individual parts for the instruments of the orchestra from the complete score of an orchestral work punched on paper tape by the new machine

In addition he hopes eventually to get Illiac to perform other burdensome tasks of the composer such as transposing music to another key transcribing old music into modern notation design of page format and finally typing the actual musical score

Low Cost Fiberglass Sports Car Body

Sports car enthusiasts will be interested in the Conquest a fiberglass auto body designed by La Dawri Coachcraft and being distributed by the International Fiberglass Corp of New York



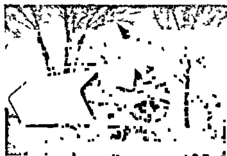
La Dawri Conquest

Three different types of Conquest body kits are available and a complete sports car can be constructed for little as $... to $... according to distributor

The chassis and other parts of the car can be built from spare parts available in used car lots or junk yards. Finished cars with the Conquest body and Corvette or Duntov Chevrolet motors are also available from the company.

Golf Car's Tires Save Grass

The Goodyear Tire & Rubber Co of Akron Ohio has come up with soft cylindrical Terra Tires for golf cars. According to the company a golf car equipped with Terra Tires can be parked on a green and the indentation would be less than that from a man's footsteps.



Car With Terra-Tires

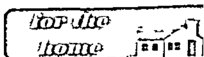
The special tires are said to provide high flotation thus eliminating costly damage to golf courses even on soggy terrain.

[illegible]

ater lover appealed to candy manufacturers to come up with a package silent enough to take to the theater.

The New York Times reports that John Hare, Minister of Agriculture, Fisheries and Food called upon the candy industry to devise a wrapping that could be opened and discarded without making so much noise that t voices on stage were drowned out.

"There is nothing more infuriati during a critical part of the play th to hear someone unwrapping a box chocolates" Hare told a meeting of t Cocoa Chocolate and Confectiona Alliance.



Develop Naturally Colored Pink Grapefruit Juice

Naturally colored pink grapefru juice has been developed by U S D partment of Agriculture scientists. the process of making the juice som of the pink colored pulp from th grapefruit is finely ground and adde. Juice made in this manner does no have the muddy appearance of colore grapefruit juice made by convention methods.

The new juice also has a higher con tent of carotene a substance the bod converts into vitamin A.

Vacuum Cleaner For Phonograph Records

"Vacu Magic" a vacuum cleaner fo phonograph records has been devel oped by the General Electric Company.

According to the company dust an dirt particles are the worst enemies o long playing records. The compan has incorporated a small powerful vac uum cleaner, which operates as the rec ord is playing, into some of its new phonographs.

A soft brush is installed just ahea of the record needle. The brush pick up dirt out of the grooves. This dirt i silently sucked into a tube running through the phonograph tone arm an

'o the cabinet interior to be accumu-
ed in a container.

periments With Water r Young Scientists

Cold tap water is the primary ingre- nt for the A C Gilbert Company s Fluid Dynamics Lab set It is said be the first set available to teach ing scientists the principles of water ssure

With the set a youngster finds out water behaves under the pressures air or gravity He can make water ions syphons force pumps and per m experiments in diffusion convec specific gravity and air pressure sus water pressure

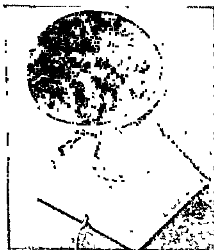
Turbine Generator Kit demon- tes to youngsters how water power ised to produce electricity Water n a faucet turns a water wheel ch moves a magnet next to a coil of to generate 6 to 12 volt alternat current The current rings a bell luded in the kit The kit is distrib d by the Product Design Co of Red od City Calif

astic Planetarium ojects Stars

Young astronomers will enjoy a new inetarium that accurately projects ore than 60 constellations on the lls and ceiling of any darkened room, th proper compensation for both time d space

The stars are projected as pin points light through holes in a plastic star ere By means of two adjustments its supporting base the star sphere be positioned to project the con- llations as they appear in any lati- in the Northern Hemisphere in season

Accessory equipment projects mythical constellation figures over the stars, which are shown in their proper order of magnitude Other accessories trace the paths of Saturn and Sputnik and simulate six types of solar and lunar eclipses



Plastic Planetarium

Called the Spitz Junior Planetarium, the device is manufactured by the Harmonic Reed Corp of Rosemont Pa

A star sphere to project the heavens as they appear in the Southern Hemisphere is available separately

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ADDRESSES

Food [illegible] *That* [illegible] U S O fice Department [illegible] New York [illegible] N Y [illegible] Rochester [illegible] N Y [illegible] KIN TEE [illegible] Chou [illegible] San Diego [illegible] Calif [illegible] International [illegible] New York [illegible] N Y [illegible]

[illegible] *Planetarium* Harmonic Reed Corp., 1100 Lancaster Ave., Rosemont Pa

Twenty-three Years Ago In Science Digest

Cyclotron —New Research Tool The cyclotron developed by Dr E O Lawrence and associates at the University of California has far exceeded expectations With this instrument, ions of heavy hydrogen have been produced with energies of over five million electron volts As regards the much discussed useful liberation of nuclear energy, this does not yet appear to be in sight

1937

Men and Women Drivers —Proof that the average man drives faster than the average woman was found in an AAA survey, which disclosed that men drivers claimed an average of 47 miles per hour on the road while women drivers claimed an average of 44 7 mph

1937

Worry and Ulcers Worry is causing peptic ulcers both among millionaires and unemployed declared Dr Heinrich Necheles of Chicago bef [illegible] American Gastro Enterological Associa- t [illegible] millionaire worries about his life and the unemployed man about a job Men are affected by peptic ulcers more than women in a ratio of 10 to 1

1937

Air Conditioning —By the end of 1937 $85 million worth of air conditioning apparatus will have been sold an increase of 60 percent over the sales of 1936 Optimists predict that by 1945 no office building or factory, and no home costing more than $6 000 will be without its year round air conditioning plant

1937

Radio Cooking —Radio short waves may be used for cooking food in ice An Austrian physicist put a large piece of raw beefsteak into water and froze it into a cake of ice When the radio short waves had been turned on, the beefsteak was cooked to a turn—inside the block of ice

1937

TV's Biggest Question —Lenox R Lohr, NBC president says the biggest economic question confronting television is "Will it be commercial when it comes? and 'How well will television sell goods?"

1937

Designers of the 1939 New York World s Fa r are reported to be menting with fluorescent pa nts that will make exterior wa's pastel shades of color at night